

AVIATION WEEK

JULY 12, 1954

50 CENTS

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Skiers are none of the easy B. F. Goodrich heated rubber applications.

Heated rubber keeps leading edges warm. On propellers, it prevents ice from building flying speed, on stabilizers, it prevents air control, on wings, it eliminates chance of snapping, on ruddervators, it prevents accurate control of flying. Room for in-flight heating.

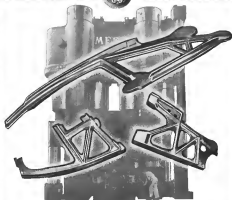
Heated rubber keeps ice from clinging and air inside the air scoop, jet engine intake and diffusion cone, it keeps plentiful air supply.

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have created engineering problems, the solution of which has required longer and longer forgings of high-strength aluminum alloy. Examples shown above are forged structural members used in a modern military bomber, the largest more than seven feet over all. These are forged in on 10,000 ton press, the biggest ever built in this country.

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Domestic

Second YC-119C helicopter conversion of General Electric 540 made its initial flight late last month, during which 48 min. First YC-119C made its maiden flight May 20 (Aviation Week May 31, p. 67). Both planes are powered by 5,750-shp Allison YT-56-A-3 turbines.

Cessna XY-2 tactical tiltrot fighter will be moved by Navy to Brown Field near San Diego late this month to begin first five flight tests (Aviation Week June 25, p. 7).

H. Lee White, former Assistant Secretary of the Air Force, has been presented the Exceptional Civilian Service Award for "exceptionally meritorious service" from Feb. 27, 1953 to July 2, 1956.

Eastern Air Lines has petitioned Civil Aeronautics Board to receive approval of a public Civilian National Airlines merger (Aviation Week June 25, p. 12). The merger again asked CAB to determine proceeding into whether TWA controls Columbia's stock.

Robert Adams plans to begin bid for military charter contracts, now a negotiating the loss of additional transports for the operation.

Armed youth, who headed an American Airlines DC-6 wreckage up at Clive last last week and demanded that it fly to Miami City, was shot and killed by the plane's pilot, Capt. William Benoit.

Change of name of California Eastern Airways to California Eastern Airline, has been voted by the airline's stockholders.

Propeller contract totaling about \$9 million has been granted Aeroproducts Division of General Motors by USAF for 420 props to go on Fairchild C-119s. Parts. Armed will operate aircraft employment at the Fairchild Division, Ohio, plant into 1955, according to manager R. E. Lynch.

Army Field Forces has organized a board at Fort Belvoir, N. C., to handle airborne transport development and projects.

Monroe Aircraft, Inc., has reorganized, reformed and reopened its production facilities at Lees Ferry, Arizona, near Phoenix.



New Amphibious Ski Gear

New universal landing gear for operating from land, water or short-landing land has been approved for service use on Marine Corps Gross DB-4 known planes. Biphasic lift portion of the landing gear, which resembles this, is partly submerged in the water. Using it, planes can take off from beaches, across water to become airborne or land on the water and skid across its surface to a full or short stop of land. The landing gear is made by All American Engineering Corp., Wisconsin.

Co., Denver. Vost will supply replacement parts for the oil mist switch.

International

First prototypes of Folland Aircraft's lightweight fighter will be called the Midge instead of the Gnat, because the name Midge will not carry the British aircraft's ultimate powerplant—British Olympus turbojet of 5,000 lb thrust. First prototype probably will be equipped with the 1,540-lb thrust Armstrong Siddeley Viper.

May Jack Berry, 59, first and only manager of Cleveland Hopkins Municipal Airport, has submitted his resignation because of ill health. Possible successor, deputy airport commissioner Claude F. King.

PAR lightweight autogiro made its public debut in a Gross 340 Bregin in the eighth annual All Women's Team competition Air Race ("Ponder Pull Dab") The driver, designed and built by Sorenson Gyrocopter Co., Santa Monica, Calif., is a two-man winged 17 ft.

Aviation National Guard strength has reached nearly 50,000 men, highest in ANG's eight-year history. During the Korean war, 22 of ANG's 27 tactical wings were on active duty with the Air Force.

All rights, parts and tools for Swift 125 two-place personal plane, first generated by Vance Aircraft Corp., Dallas, in 1950, have been sold to Vost Aircraft

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Designs Helicopters, Ltd., Vancou- ver, plans to start the first commercial helicopter service in Canada from Toronto to Prince Rupert and Ketchikan, B. C.



BOMBING B-47, 6-JET BOMBER at Lockheed Aircraft Corp., Marietta, Georgia, serviced by G-E Frequency Changer package that supplies ground power for testing all electrical control and equipment for radar, radio, and gunnery.

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GROUND POWER SUPPLY PROBLEMS**

GENERAL ELECTRIC

WHO'S WHERE

In the Front Office

L. New Filler, former chief of main design in Chance Vought Aircraft, Inc., has joined Texaco Aircraft Corp., Dallas, Tex., as the newly created job of vice president engineering in charge of advanced aircraft of the firm's own design.

John M. Goss has been named executive vice president of Fairchild Camera & Instrument Corp., Dayton 1, N. Y. **John B. Moore** has joined the firm as public relations director.

C. L. Bradford has been appointed president and a member of the board of Ray Co. Titanium, Inc., Pittsburgh, Pa. He was previously vice president-director of operations. The firm's former president, Walter O. Koenig, has retired. New board chairman is R. S. Fisher, succeeding Walter H. Cohen, retired.

Edw. Geo. Willie E. Shaugher (1934, B.S.), has joined W. J. Maxson Corp., N. Y. C., in plant and program administration. Shaugher spent the major part of his military career in Army Ordnance.

R. J. Sullivan, president of California Eastern Aircraft since 1945, has been promoted to additional post of chairman of the board. **Anders G. Sant-Paul**, board chairman and chief executive officer since 1945, declined reelection but will continue to serve CEA in a consulting capacity.

Changes

Kenneth E. Bowman has been named engineering manager for the United States department of General Electric Co.'s Associates of California System Division.

W. M. Nelson has been appointed an installation staff member to North Atlantic City. He was previously in charge of the firm's work in Washington, D. C.

Joseph S. Selen has been designated manager of international sales by Northwest United Airlines.

William F. White has been appointed sales manager, aeronautical and space products, by Hagen Corp., Pittsburgh, Pa., to test and equipment units.

M. Vandyke has been named manager of the new Federal Division of Cook Electric Co., Chicago, Ill.

Douglas M. Heller is new engineering director of the Milwaukee (Ind.) plant of Bendis Products Division, Bendis Aircraft Corp.

Honors and Elections

Dr. I. F. Gross, chief of Research & Development, General Electric, Board, and an honorable advisor to the Canadian Chief of Air Staff, has been elected first president of the newly formed Canadian Aeronautical Institute.

J. L. Atwood, North American Aviation, Inc., president, has been elected to the board of Aircraft Management Assn.

Charles F. Bennett, vice president of Western Corp. Works (Longwood, Calif.), has been appointed a member of the National Board of Field Advisors in the Southwestern Administration.

INDUSTRY OBSERVER

Boring Airplane Co. has accumulated more than 500 hr. flight time with its two prototype Stratoforers, the XH-52 and YH-52. An F-4 Phantom has accepted the first production bomber, the B-52A, and held it right back to Boring.

Pratt & Whitney Aircraft has developed a method of removing compressor blades in jet engines without unstaking the disks supporting the one in which the blade is installed. This time-saving feature has been applied to the PW4A's J57 turbojet, otherwise report.

Boring's Wichita Division may have its first production B-52 off the line by fall of 1957. Wichita already has built more than 700 B-47 Stratoforers in producing them not at a fast rate. The division reported 112,000 man-hours for final assembly of the first B-47 three years ago, but a recent Stratofor took only 4,118 man-hours for the final assembly operation.

Large jet engine overhaul facility at Tuskegee AFB, Okla., has completed overhaul of the first PW4A J57 it has received in preparation for future large-scale overhaul operations with this powerplant. This first unit provided the required instrumentation for turbine maintenance personnel.

Douglas Aircraft Co. is coming up with several D-57 changes designed to reduce noise and vibration, reduce stressors as they include general stiffening of the fuselage in the area near the wing and of those fuselage end panels, some of its back in the wings. Some fuselage bulkheads will be "thinned" and more accurate welds and more accurate manufacturing material will be added. Observers say this could cut D-57 operations up to 500 lb. in additional weight.

Douglas X-3 was on public display during National Advisory Committee for Aeronautics recent open house at its new Edwards AFB, Calif., facility. The Mach center is scheduled up to Mach 5.5. X-3 has not been flown since it was turned over to NACA some months ago. The flight program is due to start soon, however. Bell X-2 has not been turned over yet to NACA due to delays in installation of its rocket engines.

F-100 part of the F-50K, new in production at the Fiat plant in Turin, Italy, is estimated at \$500,000, without spare parts, by Tracy S. Voorhees, director of aircraft procurement for Defense Department. He estimates the F-500 cost at the British-built Gloster Javelin at between \$350,000 and \$420,000.

Hawkins Titanium Corp., of Princeton, N. J., has been awarded a \$504,180 contract by General Services Administration for construction of a pilot plant to study a new process for producing titanium metal. The contract provides for minor of every step on pilot operations, if the process proves successful and later is used in commercial production.

National Advisory Committee for Aeronautics now will get a C-102 F-102 and a North American F-102 for high-speed flight testing. USAF will have over one of its early F-102 aircraft to NACA by study.

A jet fuel network in Western Europe, involving 4,600 mi. of pipeline and storage facilities for 400 million gallons, is scheduled for completion by July 1957. The network, designed by the Germans for the deployment of NATO jet aircraft, extends from above the Arctic Circle to eastern Turkey. July 1955 is set for completion of 30% of the pipeline and 50% of the storage space. By July 1956, 80% of the pipeline and 75% of the storage space is scheduled for completion, leaving 30% of the pipeline and 25% of the storage for completion the following year.

General and Turkey are scheduled to get General Electric F-86 Sabres from the British Royal Air Force. The jet-like Sabres, which are the RAF now consists of 400 General Electric F-86 Sabres powered by General Electric B47 and Avco Canada turboprops. B47 will pass on the other [47] powered Sabres to the Canada and Turkey when it finally gets operational squadrons of British-built Hunters and Swifts.



Full Motor Ground Supply Unit, 100/1000-amp, 28 volt delivered. See Bulletin GEA-5119



Engine Driven Full Range Unit, 1500/1500-amp, (Delivered) See Bulletin GEA-5120

New type NE-5 generator manufactured by the General Electric Bendis Corp., Stamford, Conn., equipped with 9-4 A-6 and DC generators, rectifier and control (below)



Airlines Again Ask Fare Talk Approval

- ATA chief tells Board of cost-profit squeeze.
- Johnson says passenger rates are key to problem.

An transport industry facing "an economic and a financial problem," again is asking Civil Aeronautics Board for permission to discuss fare and rate increases.

A similar request made recently by Air Transport Association was turned down by CAB and the decision was hailed by critics other than those from and rates. (Aviation Week, June 25, p. 28).

Earl Johnson, president of ATA, outlined the basic problem in a presentation before CAB.

Principal factor composing the problem, according to Johnson, was: "A need to protect the domestic market. New equipment and new fuel (jet) are required. Passenger revenues accounted for 58.16% of the domestic airlines' total revenues in 1953.

Patterns of passenger movement show that only four-twelfths of 1% use air travel to the non-100 mi segment to the 100-250 mi segment; only 10% of the passenger travel is by air, and half of that comes from two coastal-New York-Washington and New York-Boston, in large of more than 1,000 mi., airlines are moving 71%.

"That the bulk of income comes from long hauls."

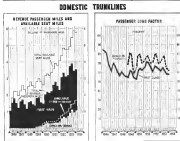
Depreciation charges and difficulty in obtaining equity capital. Since 1946 air transport has accumulated a depreciation reserve of \$475 million. During that time the industry made capital expenditures of more than \$750 million for operating equipment. Depreciation provided only two-thirds of the amount needed for new equipment.

Load factors have been declining steadily in the last three years. Although passenger revenues are expanding, the gap between costs available and costs used is widening.

Operating costs have increased to the degree point.

View of the fact that 58.16% of total revenues come from passengers, Johnson noted, "when we are talking about the passenger, we are talking about almost everything."

Growth (Aviation Week, 146) the Board that, for the first time since the



Civil Aeronautics Act of 1938, the airlines could be entering a period of operations relatively free from the constraints stemming from other perspectives for us as from war time.

"The industry is now seeking a rise and a status where we believe it should

be able to achieve a state of economic health sufficient to enable it to operate more closely along the lines currently associated with private enterprise in America," Johnson said.

"We all know the fantastic growth of the airline industry since 1938,

immediately prior to the war we had less than 400 planes... with a seating capacity of 23 and an average of about 170 mph." Then comes the tremendous World War II surge with people standing in line to get on the airplanes, with passenger establishments, with the country moving by any means it could get.

"... World War II showed... load factors approaching 90%. But it is significant that even in that era we couldn't average above that level."

"Then the Korea war. And of course the terrific expense with accompanying increases in load factors and then trending down, and, in our view, our new focus, the load factor is approaching something close to normal. Nobody can say quite where that is going to be, but certainly it ought to be somewhere in the area of 55-60%." This happens to be our forecast for 1954.

"The average falls between 58 and 60%, but actually it now is slightly under 59."

So from the standpoint of the industry, from the standpoint of management planning-management can't plan on war and it can't plan on rearmament and no program of the category we have just been through. We have to plan on something that recognizes the costs and certainly everything we have gotten to be world indicate that today we are about in the normal range and not in a World War II or Korea period."

Load Factor—The ATA president pointed out the impact of slight changes in load factor on the industry.

"If in the year 1948, for example, we had a 1% change in load factor, up or down, it would have affected our net operating income \$6 million. Naturally, as the volume of business increases, a 1% change results in a greater effect. So that by 1953, a 1% change in load factor on the present volume of business produces \$41 million, plus or minus, in net operating income."

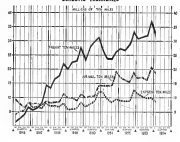
"If we go into the mid, the industry has to absorb all \$12 million if they haven't any tax carryback. Whereas if it gets up \$12 million above in the black, they can only keep \$6 million," Johnson stated.

Regarding accumulation of depreciation funds and obtaining new capital, he said:

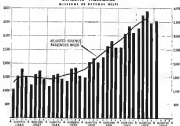
"... I want to point out that nobody in business expects to depreciate a \$500,000 airplane and get enough out of it to buy a \$750,000 or a \$1-million in a 10-year cycle. But management has to be to say: How much do I need? This is what I get from depreciation. I need that much more. Where do I get it?"

The money comes from two sources, according to Johnson.

FREIGHT, EXPRESS, AND AIR MAIL-TON-MILES FLOW DOMESTIC TRUNKLINES



TREND OF REVENUE PASSENGER-MILES DOMESTIC TRUNKLINES



Earnings retained in the business over what is paid out in dividends.

New capital.

"Since 1946," Johnson noted, "except for the period immediately following the war when people were so enthusiastic about the aviation industry and we were able to go into the street and raise some equity money, virtually no equity capital has been raised by the business and, finally, that is a weakness in the business. We are pre-siding and pre-paying and our equity grows thinner. The result is that business

could be more violently damaging when they do come."

"I don't want to get into a discussion of the stock market, but I think the public opinion of the airline industry is lower in our more recent and will become even lower if this trend continues as it is in the next few years."

Changing Costs—A rise in operating costs is causing great concern in the industry.

"The operating ratio does not have to be above 100 for the industry to be

in the end. It just needs to approach 300% and stay somewhere close to that 100% line. As soon as the great news gets up to a level of 50% in 1978, the industry is in a very difficult position. But in 1946-47 the spending ratio actually rose to 127% of income.

With Korea beginning in June 1950, it fell off to where it averaged in the area of 85%.

"Now it is gradually climbing... At the end of the first quarter of 1954, it shows just a slight dip below 100%."

At that point in the first quarter of 1954, we were approximately at a 93.5% operating ratio.

► **34 Percent:** ATA presented a 1954 forecast for domestic linerliner based on present inter-rail fares and involving the following assumptions:

► There will be no worsening of the international situation which would lead to U.S. intervention at war or to a severe air defense preparation.

► Current extremely low domestic business conditions and the shortage of the replacement period indicate modest increases in the speed of replacement and little support for an upsurge trend over the remainder of 1954.

► Domestic passenger income will be severe and will not return to an adequate level.

► There will be a reduction in the dollar rate of the total constant carrier inter-city market and an increase in private auto inter-city travel. Among the common carriers, railroads and bus lines will continue their decline and air will continue its growth but at the lowest rate since 1939.

Based on these assumptions, ATA forecasts:

- Domestic passenger-miles will increase 10 to 15%.
- Rail passenger-miles will increase about 20% in anticipation of the increase due to the interurban-hyatt experiment.
- Express mail will decrease 20 to 25% on an annual basis continuing the decline of the last eight months of 1953.
- Freight ton-miles will increase about 3 to 5% in line with the increase observed in the first quarter of 1954.

ATA also predicts that total revenue this year will be 1,744,375,000 in 1954, a gain of 100,550,000 miles; however, net operating income will drop from \$87,376,916 in 1953 to \$34,887,000.

► **Income Sources:** The scheduled air transport markets, but few principal sources of income, and just, including parcel post, which is expected, are freight and passenger revenue, the ATA predicts next.

"We described the difficulties of obtaining significant revenue from other than passengers."

With regard to mail pay, "We are sure that it is virtually impossible at the present time for any company to know what is going to be paid for mail."

The difference between two per cent and two and a half per cent (the latter) is a source for all other income, including while the difference is being paid out.

"While schools it turns in the past has been a very significant source of income in past years, it is in recession at the moment. It is very important to these few, one of the chief concerns in this place industry is such second common ship."



Yeager and Cochran Win 1954 Harmon Trophy

Major Charles (Chuck) Yeager (left) and Major Jacqueline Cochran have been awarded the Harmon Trophy for 1954 from President Eisenhower at the White House for their outstanding military achievements during the past year. Yeager will be honored for piloting the jet-powered Bell X-1A

that return to actively will not be necessary.

"In the case of an engine, despite apparent attempts by the carriers to get the Air Transport Union, representing the industry, to promote that form of traffic, to date the results have been pretty disappointing."

A source of the air freight industry agrees, despite aggressive attempts to explain this market, that the growth, while encouraging, is still slow.

Everybody agrees that at some future time it could even exceed passenger revenues, but at the moment in terms of our immediate problem—and when I say at the moment, I mean the next few years—it can be regarded as an area in which we could see a great deal of value realizing that, against the industry, the existing investment is a major contribution from it to overall revenues.

AF, Navy Air Funds Total \$10 Billion

The Army and Navy started fiscal 1955 on July 1 with approximately \$10 billion in funds for aircraft and related procurement on hand for obligations during the year, that bookkeeping is completed as expected to show.

As of July 1, one month before the beginning of the new fiscal year, the two services had \$6.6 billion in unobligated aircraft and related procurement funds on hand. USAF, \$5.4 billion; Navy, \$1.2 billion.

New fiscal 1955 funds were by Congress total \$4.7 billion. USAF, \$3.7 billion; Navy, \$1 billion.

The \$6.6 billion on hand and the \$4.7 billion in new money total \$11.3 billion. "We \$11.3 billion, main obligations made during last year that will not be known for a few weeks yet but which probably will be about \$1.5 billion, in the present USAF and Navy will have for obligation for aircraft and related equipment for fiscal 1955."

This points to a sharp upswing in contract letting. USAF and Navy set obligations for aircraft and related equipment for 11 months of fiscal 1954, up to June 30, totaled only \$1.3 billion. USAF, \$1.2 billion; Navy, \$140 million.

Expenditures for aircraft and related procurement, however, last fiscal year with expenditures. For 11 months of fiscal 1954 expenditures totaled \$8.5 billion. USAF, \$6.2 billion; Navy, \$2.3 billion. This compares with \$7.3 billion for the same first 11 months of fiscal 1953. USAF, \$5.2 billion; Navy, \$2.1 billion.

As of June 30, the two services had \$23.2 billion in unexpended aircraft and related procurement funds on hand. USAF had \$16.6 billion; Navy, \$6.6 billion.

XF-104 Tests

► **Lockheed bids for AF's first lightweight order.**

► **New fighter is expected to exceed Mach 1 flight.**

Lockheed Aircraft Corp. submitted its bid for prototype XF-104 as the first bid for USAF's first lightweight fighter contract.

The lightweight concept, a recent page a subject of wide controversy in military and industry circles, would revolutionize many aircraft (jet and aircraft) production technology.

A second prototype now is scheduled to begin manufacturing tests, giving Lockheed a definite time edge on contractors still in the project race at Grassman, Calif., Douglas, Calif., North American Aviation and Northrop Aircraft (American West Air, S. p. 16).

The first XF-104, made in initial bid last February, Lockheed notes, has shown that the concept is feasible, but the Defense Dept. sent to a brief four-paragraph test assessment that stated performance figures, although, observers believe the new USAF fighter has a speed will exceed Mach 1, a value in the neighborhood of 60,000 ft., plus better range and more maneuver than U.S. combat planes used in Korea.

The plane was designed to handle maneuvers such as, they expect.

Sources say the XF-104—designed for maneuver, rapid production—will cost approximately half that of heavier USAF fighters, depending on the size of AF's order.

One example of production speed. The first of two prototypes built by Lockheed made initial test flight approximately a year after the order was placed.

► **Potential:** Observers forecast the new plane will not take a back seat to larger U.S. fighters as in previous wars or foreign.

This is a lightweight but not a stripped-down fighter, they say, with high lift capabilities predicted because of its performance capabilities.

Another source described Lockheed's new prototype as a "24-hour fighter," indicating some thought may have been given to using it as an all-weather intercepter.

In a 50-year development of the XF-104 contract 10 months ago, the Air Force described its new fighter only as "Designed to establish lead superiority in a given area by receiving the shot of enemy planes."

► **Lockheed's Fighter—Powered by a**

Curtis-Wright J65 with afterburner, the XF-104 has a very thin straight wing with a span of approximately 27 feet—less than that of the A-10. The XF-104 is the only military aircraft in the Curtis-Wright J65 fighter field at more than 7,200 lb. without afterburner.

Much emphasis in the XF-104's wing design was on the fact that the aircraft's work with its current vehicle for testing wings in the speed area of the new aircraft.

Fighting weight is estimated at 13,000 lb., less than that of North American's F-100 and slightly above that of the F-105.

The weight is not so heavy as was expected, observers say, because Lockheed kept trimming as its project progressed.

► **Speed Test:** The XF-104 has a top speed now for high-speed flight, giving it a steep nose-high descent during fast landing approaches. Flight tests have shown that at existing altitudes, such as 50,000 ft., are not considered excessive.

The lightweight fighter has a conventional, power-based central engine, a side-mounted and previous for both the two of standard landing equipment.

Radar guidance in lightweight fighters was one of the controversial points made in USAF arguments over that to be aircraft.

Stop Picking Up RAF Tab Congress

Congress is among its quest at the cost of U.S. funds for British unmanufactured aircraft for European defense.

Recent developments:

- The House struck off \$75 million for British planes for the Royal Air Force, in passing the authorization for the fiscal 1955 annual security program.

There was \$10 million provided by the House for the purchase of British aircraft for the Royal Air Force, in passing the authorization for the fiscal 1955 annual security program.

There were no records had been obligated. ► **Staff of the Senate Appropriations Committee, headed by Sen. Styles Bridges, completed a critical report, charging that the plan for the XF-104 contract 10 months ago, the Air Force described its new fighter only as "Designed to establish lead superiority in a given area by receiving the shot of enemy planes."**

► **Lockheed's Fighter—Powered by a**

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Sea Hawk Order

The United States has agreed to a new \$4-million order for additional Sea Hawk fighters for the U.S. Navy.

The order is for 100 Sea Hawks, which are now in the process of being ordered, but the previous \$10-million order for 100 Sea Hawks was not ordered.

The contract was signed in London by Navy Capt. J. G. O'Hanlon, U.S. Air Force procurement officer, and British Ministry of Supply officials.

The straightening out of the order is expected by a single \$100 million order. The order is for 100 Sea Hawks and has a top speed of approximately 600 mph.

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GF's Keep B-26s, C-119s Flying

Little-publicized effort plays major role in keeping French bomber and cargo fleet operational in war.

By A. W. Jewey
(McGraw-Hill World News)

Toumor, Vietnam—Most of the American technicians operating the French air force in Indo China are stationed here at the country's only first-class air base.

The U. S. operation is small, but of great importance to the French. Without it, the bomber and transport squadrons would be almost at a standstill. One group of just over 100 American technicians is manning 18 B-26s and 30 C-119s through many inspections.

■ **Military Procedure.**—There is nothing exceptional about these jobs, except that it is the first time American technicians in uniform have been loaned to assist a country in a war in which the U. S. is not in the forefront. Some U. S. officials sometimes appear to be trying to keep the American public from knowing what a handful of our men are doing in Indo China. And the officers and men have been ordered not to talk about their mission with anyone.

Although most of the Americans would like to see officially, most I learned at a point of the French air force they couldn't let me see a French air base, or prevent me from standing around, looking and listening.

On the operations base were listed 10 aircraft undergoing test, usual and that interested me. I was told that the French planes were ready for test flying, which is done by French pilots from the squadron based here.

They and supplies come out of the MEOPAC and being granted by the U. S. to France. Most of the crews in the Philippines or down here in the Far East Air Logistic Force in Japan. There are some shortages, but the French are able on the front were windbreaks.

■ **French Policy.**—The French are on more integrity in the office, I learned this was a little unusual that they might use two out of 18 aircraft for transport. It looked as if they would use them consecutively by one or two. Perhaps there was a little worry about the loss of the French.

They aren't very busy. Every French pilot with whom I talked pointed to the American technicians in the highest voice. Each said he had been to get his plane from the American group down here in his machine.

At the end of this month, the Amer-

First-Hand Report

This first-hand report from American troops in Indo China reveals the French air force in Indo China.

The new French Force, Force Indochinoise, had promised to assign it to be held to get a new July 20. The French, Jewey was spending much of his time in the French air force in Indo China.

■ **French Air Force.**—The French air force in Indo China is a small force, but of great importance to the French. Without it, the bomber and transport squadrons would be almost at a standstill. One group of just over 100 American technicians is manning 18 B-26s and 30 C-119s through many inspections.

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The C-119 out, coming from a different Air Force command than the B-26, is attributed to any loss of interest, probably in long C-119s are on loan to the French force. By September all of the personnel stationed at Toumor will be replaced by new ones.

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USAF Proposes Reorganization

Plan would raise status of research and development; personnel, financial management would be strengthened.

Full executive attention to the Air Force's two major problems—the development of new aircraft and the management of the research and development—will be the proposed reorganization.

Changes sought in the title of organization. ■ **Reorganization.**—The proposed reorganization of the Air Force's two major problems—the development of new aircraft and the management of the research and development—will be the proposed reorganization.

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his present setup, with only two name-carrying civilian consultants in addition to the Undersecretary, is weak compared to the complexity of the job.

He created White with design as "outstanding job," but said "If we are to make adequate supervision . . . for a period of years, his duties should be doubled."

White had been in charge of all Air Force programs having to do with men and money. In this position, Talbot said, he was "directly responsible for the administration of a multi-billion-dollar organization, for the management and effective utilization of a manpower force of slightly under one million military personnel and approximately 100,000 civilian personnel . . . in addition, approximately 100,000 personnel in our active and inactive reserve and Air National Guard."

These duties would be split between two men under him of the proposed reorganization.

■ **Research Problems.**—In the field of research and development, Talbot said he has been found to monitor the program personally.

"Our research and development programs are so complex that they are so advanced in such areas they will depress the future success of this nation," he told the committee.

"In the present air science age, it is imperative that we maintain at all times qualitative capacity. To do this, the

Services Make

Concessions to R&D Civilian Control

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Secretary of the Air Force said more than 100 offices will meet regularly to coordinate and coordinate, after proper evaluation, apply them in rapidly in possible to the support of the Air Force mission."

Pointing out that the research and development program will cost nearly half a billion in the next fiscal year, Tabb said "five palates and guidelines" are essential.

■ **Mass Attention**—Action to recognize the Air Force with two new Assistant Secretaries and increased emphasis on research and development program, will not change the program already under way but will focus more resources attention to their program. Further are:

■ **Interagency concern** over the failure of Air Force personnel to conduct a trial only in training expense and off-ness. A new recruiting program, parallel with an effort to recruit Air Force men into attractive to men already in uniform in order war-headed by Brig. Gen. Anna Lechner.

■ **Reduction of material and development** has been a constant theme and consistent both in the field and at staff level. The Air Research and Development Command officer consistently is trying to turn out the best possible weapon and his concern with material and production, however, is an end to his primary effort.

The entire problem is contained in the query: "Where does development stop and material take over?" Reassignment of the Deputy Chief of Staff to a position where he reports directly to the Chief of Staff and has a direct relationship with the new Air Staff Section (Research and Development) is expected to resolve this question.

The bill is for direct changes to the Air Force and the entire Department of Defense has been reported on by both Senate and House committees and is due for quick congressional action.

CAA Wins \$1.1-Billion Boost for '55 Budget

Congress has approved a \$105-million fiscal 1955 budget for Civil Aeronautics Administration—51.1 million more than the Administration requested.

The additional money is intended for continued operation of low frequency radio range and improved radio communication stations serving aircraft equipped with new low frequency radio systems. There is no legal requirement on the Administration to use the extra money appropriated by Congress.

The \$165 million total CAA is \$137,000,000 less than the agency's fiscal 1954 budget of \$138,785,000, leaving

\$26-Million Start

Air Force last week made complete initial report on its request for a \$26-million appropriation to start construction of the Air Academy at Colorado Springs, Colo.

Meanwhile, Pentagon observers said that Lt. Gen. Robert B. Thomas, special assistant to the Chief of Staff for Air Academy matters, is scheduled to be named Commander of the school. Gen. Thomas was notified from Washington last year.

First class of 100 cadets is scheduled to enter the Academy in July 1955. It will be located temporarily at Lowry AFB, Colo., until Denver, Colorado Springs is not scheduled to receive cadets until 1955.

indications in CAA activities and on placement during the new year first stated July 1 (Aeronautics Week May 1 p. 12). The fiscal 1955 appropriation was \$24,902,542—or nearly a third more than CAA's 1954 budget.

■ **CAA Funds**—Civil Aeronautics Board funds for fiscal 1955, previously approved by Congress and sent to the White House, were:

■ \$5,777,800 for administration, the amount requested. This is a \$27,000 increase over the \$5,750,800 provided CAA for fiscal 1954.

■ \$40 million for safety, previously to increase. This is \$17 million less than the \$57 million the Board reported it will need for 1955. However, CAA will have an opportunity to provide additional funds if necessary.

■ **CAA Revenues**—The following is a breakdown of CAA's new budget:

■ **Salaries and expenses**, \$97,650,000

NWA Viscous?

Viscous-Aeronautics agency is gathering U.S. interest in its technology. Viscous sent Capitol Airlines press clippings about the company (see News Week June 14, p. 16).

The British aircraft company is linked last week a photograph of two Northwest Airlines officials, vice president-operations Frank C. Jelf and M. R. Egan, NWA's European director of Northwest, visiting the Viscous plant.

A note attached to the photo said "On view of the wide interest in the current American purchase of the Viscous aircraft, with its option on a further 77 to Capital Airlines, the enclosed photograph may be of use to you showing further American interest."

This is a comparison between the \$46,719,000 requested by the Air Academy and the House and the \$47,016,000 approved by the Senate. The Senate figure included \$1.4 million for continuing operation of 57 low frequency radio range and 57 regional radio stations. The 1954 allocation was \$305 million.

■ **Establishment of an navigation facilities**, \$5 million. This compares with \$2 million for 1954.

■ **Technical development and evaluation**, \$700,000—slightly less than the \$720,000 provided for 1954.

■ **Operation of Alaska airports**, \$500,000. This compares with \$500,000 for 1954.

■ **Air navigation development**, \$2,500,000. Congress cut \$75,000 from the administrative expense request for Air Navigation and Development Board. The Administration sought \$1,985,000, the amount of Commerce Department's participation in ANDB for 1954.

The Commerce appropriation bill does not include funds for airport development. The \$22 million for Air Navigation and Development Board to evaluate this program is being considered as a supplemental bill now pending before House Appropriations Committee.

Approach Fault Seen In BCPA DC-6 Crash

Failure of the crew to follow prescribed procedures for an instrument approach is reported by Civil Aeronautics Board in the case of a Turkish Cinnamondair Pacific Airlines Douglas DC-6 crash near Gulf Moon Bay, Calif., Oct. 28, 1954. All 19 persons aboard were killed.

The plane, based from Sydney, Australia, to San Francisco, reported power slow difficulty shortly after takeoff from Hanauli and the trouble had cleared by the time it came off back over the field and required permission to continue to the U.S. Personnel was gained.

During the crash, the flight was from research clearance, according to last 193 ft. altitude above clouds from the Gulf Moon Bay has no effect on the U.S. outer circles. The accident site was between these points and indications are that the plane descended in weather conditions that did not allow visual reference to the instrument terrain.

From witnesses sent by the crew just before the crash, it appears the pilot concentrated on the terrain through an unexpected fog, said the command because of a radio interception error, thought his position was further north-east and hence a lowdown.

The wreckage yielded no evidence of mechanical or structural failure prior to impact, CAA says.



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The LO₂/H₂ Turbine—Another remarkable Hydro-Air development that promises greatly improved power handling for both Rockets and Ram-jets

Some time ago Hydro-Air successfully developed a revolutionary new fuel booster pump called the HY-V-1.

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Each of these two developments is an outstanding achievement in its own right. But the whole is greater than the sum of its parts, and the combination of the HY-V-1 Pump with the LO₂/H₂ Turbine has resulted in a very remarkably advanced Turbo-driven Fuel Pump. There are some particularly effective applications for anyone concerned with Primary Pumping Plants for Missiles.

Just another example of Hydro-Air's creative engineering and production know-how that is solving missile power problems in virtually every category from fuel systems to electronics.

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Spotwelding .240 75st Aluminum Stringers to .081 75st Clad in Wing Section on F-84-F

These heavy section stringers are a Republic design improvement in wing structure of the battle proven F-84-F Thunderjet. This instance of improved design with resistance welding is not unusual—Republic design engineers are specifying five times more resistance welding in wing assemblies and three times more in fuselage assemblies than ever before. The advantages of resistance welding in both airframe and jet engine fabrication are well known. Aircraft and Military specifications are most easily satisfied and maintained by Selsky patented Three-Phase welders. That's why approximately 90% of all the resistance welding in airframe fabrication is done on Selsky machines. Write for Bulletin 1248T for information on Selsky Type 8T aircraft welders. The Selsky Type 8T welder shown above is one of many at Republic proving its daily production Selsky's basic flexibility of machine design to do more useful work at lower operating cost with maximum reliability.

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New Helioplane

- All-metal four-planes is fully approved by CAA.
- Business flyers buy the first production Couriers.

By Edwin J. Bellas

Hingham Airport, N. Y.—First Helioplane Corp. Courier to be built from production tooling was demonstrated here recently by the company's head chairman, Lewis Bellinger.

The initial production lot of six aircraft has been sold to individuals who plan to use the new four-planes as their business, Bellinger told *AVIATION WEEK*.

A second lot of 18 Couriers is slated to start off the line at Hingham, Mass., by the end of August, with deliveries to begin in October.

► **Military Version**—In addition to the current Courier, Helioplane has a military model of the plane in the works with the top rear of the fuselage lowered to provide clear vision forward and downward from the cabin. Hop-level in this version will be increased to 65 deg., compared with the conventional Courier's 45 deg. limit, making possible even steeper takeoff and landing angles to meet military requirements.

Another feature project is a smaller civilian version of the Courier powered by a lower-powered engine.

The new four-planes Courier has been certificated without review by Civil Aeronautics Administration and basic type certificate LAA, signifying it is the eighth airplane to be approved by CAA (see page 1).

► **Safety Features**—The plane embodies all of the wide spread safety and crash safety features developed by Prof. Otto Kappeler of Massachusetts Institute of Technology in cooperation with Bellinger and tested in earlier prototypes (*AVIATION WEEK* May 16, 1959, p. 21), but new in entirely metal construction except for the skin.

Price of the Courier at \$24,320 by army factory, including a standard equipment full primary blood flying panel, 15-G seats, shoulder harness and safety belts, emergency lights, Electrol 100-in. diameter constant-speed prop, supercharger engine, magnet, hydraulic brakes, oiler lines, cylinder temperature gauge and other items. The plane demonstrated at Hingham Airport is fitted with Couriers' standard landing gear, one of the auto struts.

► **Performance**—Powered by a general 260-hp. Lycoming, the Courier at 3,000 lb. gross weight and one seat cruises at 137 mph at 5,500 ft. at 71%



HIGH-ANGLE CLIMB immediately after takeoff is characteristic of new Helioplane Courier.



ALL-METAL construction in Courier embodies crash injury research recommendations.



ALL-MOVABLE TAIL for 40% less weight and drag than conventional two-piece section.



power, which gives a fuel consumption approximating 15 gph and an endurance of some four hours. Bellinger plans to cruise at about 575 power which gets him a speed of about 150 mph at about 5,000-6,000 ft., cutting fuel consumption to approximately 11 gph.

With the wings folded 74½-deg. down at 45 deg., the Courier leaves the ground fully loaded in only

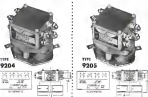
220 ft. and clears a 50-ft. obstacle at 190 ft. Use of flaps on takeoff just about doubles the plane's lift coefficient, according to Bellinger. During the demonstration it was evident that the plane can be angled upwards accordingly at approximately 18 deg., which gets it to altitude in a short distance.

► **Approach Safety**—The wings also can

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GROUND-HANDLING GADGET developed by Helix is short wave cable with snap-on hook at one end, metal tube counter at the other. Hook snaps into Conner's locking sockets easily.

fired with full-open automatic landing gear duty which plate not only on nylon bearings and, used in conjunction with the *Reps*, permit flying the Counter at about 30 mph power on.

The airplane is so designed that if a pilot has to go around again during an approach, he can safely proceed even with full *Reps* and *Reps* of full stop pitch (2,000 rpm). Landing gear can take fairly hard shocks, since it is designed for 14-in. wheel travel before it flexes another one section.

Pointing out the Conner's safety features, Bollinger commented that they total up an additional 150 lb. of extra weight. The crash safety design of the tubes, welded out with the help of Conner's Civilian Injury Research group, accounts for 60 lb. of this extra load. Building extra mechanisms into the landing gear cost another 10 lb. lb.

United States Fleet-Comstar production is virtually an assembly operation on the part of Helix Aircraft, with its Canadian licensee, Fleet Manufacturer, Inc. Ltd., handling major assemblies. Fleet eventually will manufacture and assemble some Conner's for sale in Canada and the British Commonwealth. These aircraft are expected to cost about \$1,500 less than the U.S. assembled planes.

Plastic Footed-In interesting feature of the new Conner is that it is designed to be plastic in the wing tips, tips of the "ditch" escape seat, tail fin and tail fin for the entire door frame.

Bollinger says Helix intends to increase the amount of plastic components from approximately 40 lb. now used to 100 lb. on non-structural parts where abrasion-resistant characteristics are important. Plastic sections in the fuselage will include suspension and third-set of the cabin air intake.

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Curing Agent CL is Shell Chemical Corporation's name for methacrylate derivative. It is not methacrylate Curing Agent CL. It is available to commercial purchase from E. I. du Pont de Nemours & Company and National Airframe Division, Allied Chemical & Dye Corp.

*As described in Shell Chemical literature. Name applied for.

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without important" requirement for federal aid. The Secretary of Commerce would set the criteria for determining "national importance."

By providing that covered funds from the non-discretionary fund be made available for discretionary use.

The congressional legislation is based on the belief that the Administration intends to channel export money into investments on a few big city airports. Henshaw told Murray "the original idea was entirely different from what you have explained." He said the Under Secretary's plan would not permit export developments in metropolitan areas such as Colorado, that are particularly suited to air transport but do not have the traffic needed to meet the "national importance" requirement. Henshaw called for more "cow punch" exports to encourage small living.

Rep. Offenberg and the legislation would be "the death warrant" for small airports and that "the exports that would be the most would not get it."

Board, CAA Ask New Civil Penalty Powers

Civil Aeronautics Administration has asked Civil Aeronautics Board in asking additional authority to inflict civil penalties.

The Board began its drive for authority to impose civil penalties to ensure violations of economic regulations in 1949. It now has become only to control action.

In testimony before House Interstate and Foreign Commerce Committee, J. D. Dwyer, director of the Air Transport Assn., objected that by requiring payment of fees for each violation as failure to file reports or proper form, the industry "could be swamped and choked" by costs.

Airline executives with Post Office Department and Transportation and Nationalization Service has demonstrated that while each individual civil fine amounts to little and hardly is worth pursuing, "in the aggregate they can become pretty formidable," he said. In past years, airlines have led the fight against the civil penalty authority for economic violations, looking on it as another shill the Board could use against them.

CAA spent legislation giving it authority to impose civil penalties for violations of security and safety provisions by persons serving aircraft or training is aviation. Knowledge of certification is the only action that now can be taken for these violations. Robert Boyle, CAA general counsel, said.

Defense Department has requested an amendment exempting persons using relief planes who might not hold CAA certificates from penalties.

How many places east of the decimal point?

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Installation Is Critical for Mach 2 Jets

• NACA studies illuminate effects of shock position and airflow instability on turbojet performance.

By David A. Andersen

Chockabed—Given a turbojet engine capable of efficient operation at Mach 2, how would you install it?

That leading question could set off a series of design decisions as apparent as those which still involve exhaust grids or heated casings. But whether the segment brought only up in the wind, below the wing, or buried in a fuselage, some of the foundation principles for its installation are going to come from the current work of NACA's Lewis Flight Propulsion Laboratory.

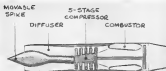
In addition to its studies on components of advanced turbojet engines (*Aeronautics Week*, June 25, p. 30), the Lewis Lab is developing ideas and testing hardware pertaining to the installation of high-thrust engines for the supersonic aircraft aircraft of the near future.

► **Typical Type**—NACA showed a typical installation of a supersonic turbojet in a potted engine. A long duct is bled from a nozzle inlet to the engine. Projecting forward from the air inlet was a movable sharp-pointed control body used to regulate the inlet area, and therefore the amount of air ingested by the engine at off-design points of operation.

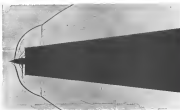
On the upper surface of the pod was a bypass door that could open during operation in order to spill air around it that might otherwise crash the forward shock too far forward to an unstable position.

Control of the shock position was handled by a motor linked to a device measuring the pressure at a point in the inlet where the shock should be located. By moving the pressure difference, should the shock move forward or back, wind, fuel flow or air flow can be regulated to maintain the shock in the desired location.

No reference was fitted to the demonstration engine. NACA's view seems to be that the pressure gain is to get such a high thrust per unit area, per unit weight that the shock waves will not be a concern. This view is shared by some designers who refer to the afterburner as an "invention of the devil."



SCHEMATIC INSTALLATION
OF
SUPERSONIC TURBOJET
DAA



UNSTEADY FLOW at the nose inlet of an afterburning engine is shown today in this new high-speed photograph of a dented body taken in the 1044 at supersonic tunnel. NACA's Lewis Flight Propulsion Lab. This is an example of the pulsing flow pattern in which the shock oscillates between a forward position and the repositioned position shown in the picture. The pressure loss is pulsating at about 7,000 cps.

► **Alternate Type**—Another possible installation of a supersonic turbojet was based at the inlet system for a jet engine mounted in a nacelle model. An underbody intake shaped like ball no longer inlet was used, upstream of the inlet the body surface was flattened in a ramp to straighten out the air flow.

This inlet works exactly like the ramjet inlet as far as the rate of shock loss. Similar inlet designs have been combined in the past by aerodynamicists who claim that the pressure recovery of such types leaves much to be

desired. This also meant to the forward, lower boundary of the inlet is moved back on the fuselage.

No recovery figures were given by NACA for either a ramjet inlet or a potted engine, or for the ramjet, half ramjet, half inlet, so that no comparison was possible.

► **Simple on Surface**—These simple inlets were evolved by NACA scientists and others working in the field of internal aerodynamics and such theoretical analysis and actual test. But their external simplicity is misleading.

light changes in configuration can have major effects on the placement of the entire installation. Here's why that is so.

There was a time when the installation of an engine was considered to be only the plumbing and wiring. Now an engine is part of a complete delivery flow system which starts outside the engine air intake and ends downstream of the exhaust.

In the case of the supersonic turbojet, its installation is complicated by the extreme range of operational speed and the extreme sensitivity of engine performance to changes in the incoming stream.

There is an even further complication in supersonic aircraft design: the weight of fuel and powerplant now dominates any other group, and now account for as much as 55% of the gross weight.

Any supersonic airplane is going to have thin wings and a clean fuselage, so that the volume of the installed engine plant will tend to be the biggest factor in determining nacelle aircraft drag.

This is a complete reversal of subsonic design practice. It can be explained by analyzing a good supersonic aircraft design. You can make various changes as long as you keep the engine clean, and you will not have appreciable drag by more than a few percent. But if you make the compressor in engine installation that you've been making in subsonic design, the fuel range at an engine speed can drop off as much as 20%.

► **High Recovery**—First problem to be faced in the installation of a supersonic turbojet engine is making sure that air is taken aboard most efficiently. Another way of saying this is that the pressure at the first stage of the compressor should be as high a percentage of the pressure available in the atmosphere as possible. The ratio of total pressure at the inlet to the total pressure of the incoming air is called the recovery.

Supersonic operation of an engine is associated with a shock wave, which is the possibility of producing a static pressure rise across it. The static pressure behind a shock wave is greater than that in front.

If the shock wave ahead of the engine nacelle is perpendicular to the upstream, it is called a "normal" shock ("normal" being used in the geometric sense).

But even though the static pressure rises across the shock, the total pressure (sum of the static and dynamic pressures) decreases. As the Mach number increases, the total pressure loss increases rapidly until at about Mach 2.0 the loss is too large to be acceptable.

► **Alternate Choice**—There is an al-

ternative to the normal shock system which gives the static pressure rise desired and yet does not have high losses. The alternate is to use first an inclined shock, to slow the air and produce some of the pressure rise, then to form a normal shock, and get the rest of the pressure rise in an inclined manner.

This is the system illustrated by NACA accounts in an installation of a turbojet engine in a potted nacelle. Design Mach number for the layout was 2.5; at this speed, a normal shock would produce a total pressure ratio of about 0.72. But by using a single inclined shock and a normal shock behind it, the efficiency will rise to about 0.90.

Initially the inclined shock ahead of the nacelle is generated by a spike protruding from the center of the nacelle. The inclined wave sweeps on the cowl lip and a normal shock is developed.

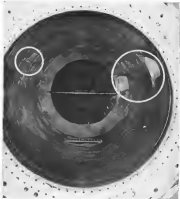
In practice, the precise positioning of the normal shock at the cowl lip is difficult, and so it is generally allowed to stabilize nonuniform downstream. Under this sort of a normal shock, the shock will hit back the inclined shock, to detach from the cowl lip to

slow air to stall around it. This can produce a widely variable flow condition that can ruin engine performance and perhaps even the structure.

► **Position Control**—The shock pattern depends on speed, shock position, angle of attack and altitude. There are times when a single design condition from all these variables (for example) could be a variable with respect to the engine at a constant speed, but some of the time, there is a whole envelope of design conditions, in one condition and a number of "off-design" points.

The shock position for most efficient operation of the engine must be maintained through all possible range of operation if the installation is to be a performance success. NACA investigators, working with target controls (shown there is an exactly similar problem) evolved a shock positioner. Control is by a pressure sensor, located at the desired position of the normal shock.

When the shock is downstream of the sensor, its pressure reading is lower



SHOCKS IN THE AFTERBURNER produced the structured pattern shown inside the nozzle. Choking of high-speed, high-temperature gases is believed to be the cause of failure. Shock can be controlled with methods developed by NACA scientists.

thus the control setting. The actuator is a servo system to increase the fuel flow (increase mechanical pressure) push the shock forward to its control position. A similar procedure will move the shock back if it is ahead of the control position.

Tests made of this system in the 5 x 6 ft. apparatus tunnel at Leval have shown NACA that the control will work. The engineers are at it directly applicable to the problem of control of a supersonic turbine.

► **Oil-Design Considerations**—When a variable speed range is considered, the inlet problems for a supersonic engine get more complex. The shock wave pattern changes with speed and other variables of flight, and the inlet must accommodate these conditions. The only alternative is inefficient operation at all design points, and this may not be acceptable.

At off-design points, a turbine requires a different amount of air from its design value. To get this, and at the same time to maintain the shock pattern, if it is necessary to alter the inlet area.

One proposed method demonstrated by NACA is the movable spike, a conical body which moves forward and backward in the inlet. Forward motion reduces the flow rate, forward motion increases it. This is not a new idea, it has been suggested and tested several

times in the past with supersonic jet engines. In these applications, it was not desired for inlet because of the mechanical complexity in an area of high temperatures. In a supersonic turbine inlet at Mach 2, there is not the same degree of worry about mechanical and heat.

Another method of air control is the bypass door, which may be used alone or in conjunction with the variable area inlet. Function of the door is to provide air either to the motor or it might be used in flight between two valves to supersonic speed at rest or a coarse adjustment in air flow so that the shock could become attached. The movable spike would then act as a fine adjustment to handle engine variations set up by other basic changes in the motor.

These controls are simply an actuating system; they do not replace the mechanical control which regulate fuel flow and other parameters.

► **Shock-Out** of the plugging disadvantage of the shockwave is that it vortices. That is a lateral displacement of one of the waves generated by an oblique flow in the afterburner system.

Shock is destructive, a glance at the picture of the damaged afterburner lens (p. 20) shows that NACA has developed methods for preventing shock, but details must remain under

secrecy until the test has been completed. High speed tests have been used to be developed to analyze shock. Water-cooled probe measurements were used to measure shock characteristics within the burner. Temperature gauges determined the position of the wave front and its location. Other probes measured the rate of heat release variation with time and position.

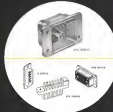
NACA says that changes in combustion characteristics, flow conditions and fuel feed may help control the shock.

► **Fuel Changes**—The afterburner operates under conditions of higher air velocity and lower pressure than the primary combustion in the engine. These different conditions present air problems.

One possible solution is to be found in fuel for afterburner, says NACA. Pyrolytic metal, one of a series of afterburner fuels under investigation, has been tested and shows considerable better than twice the flame speed of jet fuel. Since flame speed is one measure of fuel efficiency, the importance of such a fuel is apparent.

Chief advantage of a fuel with a high flame speed is that it flows will stay attached to a flameholder to a much higher air flow speed than will the flame of one of the more common jet fuels.

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View with hermetic seal removed showing location of seal to glass case for penetration to the switching mechanism. (Note: Is for description of stream sealant and is sealed off—does not couple fluid with dry elements.)



Gateway view shows slight pin, double-flow outlet arrangement. Shaded portion indicates the sealed gas enclosure. True hermetic seal is provided by glass to metal seal for penetration of gases indicated by arrows.

MICRO SWITCH provides a true hermetic seal by glass to metal and metal to metal sealing

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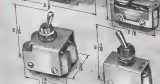
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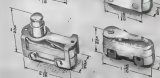
TOP—Die cast enclosures with condensation drain holes for mounting assembly of 3 hermetically sealed switches (left), two switches (center) and one switch (right). For relay assemblies.



(Left) Die cast enclosure with sealed plunger actuator and control connection. (Right) Sealed plunger mechanism for pushbutton.



MICRO SWITCH provides wide variety of actuators and housings for hermetically sealed switches



Toggle switch assemblies for two hermetically sealed switches (left), for one switch (right).

(Left) Plunger actuator for use as push button or limit switch. (Right) Standard hermetically sealed switch.

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at Lewis laboratory to find out how to "build" fuel molecules with the desired characteristics. Results so far show that propylene oxide, with its improvement by a factor of two over regular jet fuels, is by no means the most promising fuel.

The final result of such savings may mean that the finest available from an afterburner could be worth double.

► **In Summary**—A superoxide indolylid is a far cry from its carbeneic sister, just as its installation is only distantly connected to carbene insertion.

It is not too long ago that one or two engine companies were daring to look ahead to turbojet operation at Mach 1.2 or 1.4, believing (based on their contemporary knowledge) that above these speeds a swept engine would be the only answer.

Now the Mach 2 turbojet seems to be around the corner as an aircraft powerplant. It has been here for a while in component form and in studies like those described at the NACA laboratories, and at the extensive industrial laboratories maintained by

Progress has been aided by the long backlog of basic research and development on rocket engines done by many of missile contractors. Much of the NACA turbojet experience can probably be traced to rocket engines.

In any event, the crossbreeding of knowledge will help foster a new type of engine—a true supercruise turboprop with thrust high enough and fuel consumption low enough to give both blistering speed and effective range to the supersonic combat planes of the next generation.



Lab Duplication

Stability studies on Coffin Kuhn's flight director and autopilot were performed with the cockpit/autoland/autopilot simulator (left) and Kerver analog computer (right), enabling engineers to isolate human or system flaws when duplicating unusual flight conditions.

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Tempe Pressure Switch
This actuator is the heart of the Airtec Automatic Propellant Gasflow System.



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EXPERIMENTAL MODEL of pilotless copter undergoes flight test (right) powered by 12-hp electric motor. It weighs 140 lb. empty.



LANDING system allows rotor speed conversion to torque on ground.



SONAR BEAR mounted in tip rotor made rapid to operation as motor unit.



BAIRD RANGE can be easily increased by using rotor tube instead of old.

Army to Test Small, Pilotless Helicopter

A pilotless, tethered, electrically powered helicopter soon will be tested by the U. S. Army Signal Corps in an aerial platform for a television camera to transmit the visual image of ground troops.

The Alstrom Co., Skaneateles, Pa., has built an experimental model and is negotiating a contract with the Army for a prototype of an aircraft capable of carrying about 150 lb. of useful load with a total thrust of 500 lb.

Charles C. Miller, vice-president of Alstrom and veteran helicopter designer, says one of his models will be low enough to make it dependable as battlefield observation.

► **Potential.** Possible applications of the Alstrom copter include:

► **Closed circuit television.** The camera, mounted on a swivel, can be controlled by the ground operator through 350 deg. and stopped in any position. Scene can be shown at the base of the

tether or transmitted to a distant post.

► **Antenna tower.** Range of transmission and reception of low frequency radio can be increased by lifting the antenna into the air.

► **Radar scanning tower.** Equipment to localize and receive selected radar beams can be taken to operating altitude for test purposes.

► **Missile-launching.** Device can be designed to provide a ship, towing weapons or observation equipment.

► **Antisubmarine warfare.** Sonar gear could be operated from the Alstrom, sending its signals back to the operator on a ship or another submarine.

► **Flying crane.** Equipment, supplies or personnel could be moved across rivers or terrain.

► **Equipment for weather analyzing, atmospheric testing, for radioactivity, floods or floodlights, traffic control, police address system and firefighting devices are possible from Alstrom.**

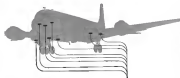
Military helicopter pilots claim the Alstrom copter can be used for rotary-wing pilot training because its operation illustrates fundamental principles of helicopter flight.

► **Experimental Model.** Custom of the Alstrom's flight, Miller says, will be limited only by the life of its parts.

Basically, it is a control helicopter with a double set of counter-rotating blades. Electric power is sent to the motor through an embedded cable, which also will transmit control signals and return impulses from the copter.

Miller has flown an experimental model of the Alstrom for 10 hr.

Equipped with 14 ft. rotor blades and a 12-hp three phase electric motor operating at 10,800 rpm, this model has an empty weight of 140 lb. and can carry a useful load of 130 lb. Weight of the tethering and power cable runs 17 lb. per foot and feet. Total thrust for the model is 270 lb.



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OSTER lightweight Synchro Transmitters type 250 Auxiliary to 250 in low impedance designed. Her many standard models in the inventory also shown, a low impedance low current unit (photo not shown) is available on special order.

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- Synchro: Conversions, Coupled Transmitters, Transmitters, UNICUT, two Rotors, Rotors and Two Speed Synchro
- The Synchro: Conversions and Rotors for use with D-C and A-C supply voltages (specify voltage on sketch or sketch and ground impedance)
- Aeronut: Rotors, both inner and outer

digital rotor than half of that placed for the Signal Corps prototype.

The Altoscan will be launched from a small platform built on top of the power-assisted track which can be moved to the front or down to its side landing.

Control Methods—Control of the aircraft for vertical rising is effected through the speed of the motor regulated by frequency of the alternator.

Horizontal movement is obtained by tilting the small aircraft, shifting the plane of the rotor drive. In the experimental model, this is done by steps connected to each of the helicopter's three legs. In the prototype, a more complex system will be used, controlling controls in a single station where they can be operated by one man.

Altoscan controls are strong enough to go, complete visibility to the side in the air, limited only by the length of the tethering cable. He says the Altoscan cannot be blown off position by the wind.

Two-Year Project—The project is about two years old. The Altoscan Co. at present has eight employees and up grades out of two largely at an airport in Fort Worth.

The company is affiliated with the Quaker Cyl. Metal Wrenching Co. and Tech Manufacturing Corp., all headed by A. J. Rocco, who is associated with Miller in the Altoscan project. Miller was employed for six years as a helicopter designer by Sikorski Helicopter Corp., Stratford, Conn., and prior to that by Koffler Aircraft Corp., Camden, N. J.



Big Memory

Magnetic memory, capable of storing 64,000 binary digits (bits) as a magnetic coded-down at pulse increments up to 1 μs, has been announced by Kollman Instrument Corp. "User is designed to permit continuous recording and extraction of stored information. Company also makes associated read and write amplifiers, Types 1000 and 1001, respectively. Address: 6946 45th Ave., Elmhurst, N. Y.

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Argentina	LV	Japan	JA
Australia	NH	Jordan	JJ
Austria	OE	Lithuania	80
Belgium	SO	Luxembourg	LL
Belgian Congo	CP	Madagascar	XX, SB, SC
Bolivia	CP	Netherlands	PH
Brazil	PP, PT	Netherlands Antilles	PH
Burma	XZ, XT	Norfolk Island	NI
Canada	CF	Norway	LN
Chile	CC	Philippines	AP
Ceylon	CY	Poland	SP
China	CC	Portugal	CP
Czech (Czechoslovakia)	ST	Prussia	PR
Cuba	CU	Providence Island	PI
Denmark	OM	Reunion	RE
Dominican Republic	RD	Saudi Arabia	SA
Ecuador	EC	Spain	EC
Egypt	SE	Sweden	SE
El Salvador	ES	Switzerland	CH
France	F	Taiwan	TA
Germany	DD	Turkey	TC
Greece	TS	Union of South Africa	UJ, ZJ, ZA
Haiti	HT	United Kingdom	G
Holland	PH	Guam and	
Hong Kong	PK	Protectorates	VF, VQ, VR
India	VI	United States	R
Indonesia	II	Uruguay	CU
Iran	IR	Venezuela	VV

"VICKERS AIRCRAFT HYDRAULICS IN USE"

This table includes all nationality marks that have been formally notified to ICAO up to June 19, 1953. Seventy-five percent of the countries... these marked with an asterisk... have registered commercial aircraft which use Vickers Hydraulics. Vickers Hydraulic Equipment for aircraft is so widely preferred because it is dependable, efficient, light weight and compact. Ask for new Bulletin A-5220-B.

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ONE PROP FEATHERED, Camair 450 Twin Navion carries four passengers, full dual load



TITANICS add 40 gal to capacity, also act as boost to improve looped control.

Camair Builds New Navion Twin

A new high performance two-engine conversion of the single-engine Raven Navion is being offered for business purposes by the recently formed Aviation Division (Camair) of Cessna Inc. Waukegan, Ill., Macquid Airport, Cobscook, Tex.

Camair expects to have its first production Model 450 off the line Aug. 31 and plans to be turning out a plane a week by the end of October. Approximate price is \$12,900 if the purchaser supplies a basic single-engine Navion airframe; \$15,000 without one.

The company states that the 450 has been fully certified as the standard category by Civil Aeronautics Administration. Production models are to be certified on Form 137 under a special production certificate because of future Cessna's approval for modified production and modified type certificates. To the firm's knowledge this is the first time such application has been made because these certificates have not been available previously, it says.

► **1953 High Cruise**—Specifications and performance for the Camair 450 Twin Navion give the plane a cruise speed of 182 mph at 75% power at 6,000 ft. Gross weight is 3,910 lb. and useful load is 1,200 lb.

Two engine sets of dual at sea level is 1,710 ft. single engine climb 490 fpm. Two engine service ceiling is 22,000 ft. and cruising ceiling is 9,900 ft. Range is estimated 900 mi. Fuel capacity is 148 gal.

Wing loading is stated to be 21.3

lb./sq. ft. and power loading 12.7 hp/lb.

► **Single-Engine Safety**—The Camair 450 Twin Navion is powered by two Continental Q170-B engines. Each develops 240 hp at 2,600 rpm, turning constant-speed, controllable, full feathering Hartzell prop. With four passengers and full gross load (105 gal) the 450 is capable of flying on one engine, Camair says.

Engines are fitted with stallion steel separator tubes exhausting beneath the wings to keep cabin more level down. The exhaust is used as a jet pump to pull raw air into the cylinders to cool cooling air and engine temperature.

► **Wingtip Tanks**—The Camair 450 has



COCKPIT features dual controls, electric fuelmats, overhead panel for switches

wingtip tanks, containing approximately 36 gal. each. These also act as boost to improve aileron control at low speeds and lead to subsonic wing loading in flight. Tanks have navigation lights in the nose.

Increasing the single engine Navion's fit and safety area is treated with a totally adding the 450's single-engine capabilities. The wheel base has been lengthened approximately two feet to improve landing stability and ground handling.

Lengthening the nose to move the main gear forward provided room for extra baggage area ahead of the cockpit. Goodwin many wheels have air pit tires and single-dish brakes.

► **Cockpit Arrangement**—To keep the main instrument panel uncluttered and provide good spacing of instruments and radio equipment, an overhead panel is used to carry switches and rheostats. Many panel dials have two glass indirect lighting.

From rubber mats are standard equipment. To aid entrance and exit from the cabin there is a cockpit step in the left wing flap.

► **Camair Background**—The parent firm, Cessna Inc. Waukegan, Ill., is an all local and commercial company. Camair, its new Aviation Division, has been set up in a 90,000-sq. ft. plant at Cobscook to handle military and civil aircraft overhaul, repair, modification, maintenance and conversion, in addition to production of plane parts, assemblies, tools, dies, jigs and fixtures. Aircraft quality steel forgings are a specialty.

The division has a research and development department to do basic research and development of aircraft electronic and mechanical equipment. It plans to do proprietary work in plastic and bonded adhesives, according to company officials.

British Develop Paint For High-speed Jets

A British company has developed a new paint for high-speed jet fighters and bombers that will not peel off in extreme flight. The paint already has been tested on the tail of one of RAF's latest type jets, and soon will be tried on the whole fuselage.

A similar U.S. development, Convex Plast, was described in AVIATION WEEK, Apr. 19, p. 30. Like Convex Plast, the British development is based on a new resin. It will also resist high temperatures but the action of jet fuels, lubricants and salt spray. A single coat of lightweight primer is applied before the one coat of high-speed paint is put on.

Griffin, Ltd., Rochester Rd., King's Lynn, Norfolk, England.

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► Completely instrumented and can indicate attitude with conventional or dual display presentation in solid colors.

► Compact with weight only 9.6 lbs.

► Single feature has electric drive of pointer motor.

► Larger aperture greatly improves readability.

► Non-rotating gips.

► Dependable surface texture for good pointer location in testing of low-level type attitude.

► Light shade on face of dial more legible than dark surface with white markings.

► The use of dual scale (vertical) feature (vertical) feature.

► Indicator may be mounted in either conventional or bulkhead panel.

► No 14.5, system consists of dual mounted indicator, dual amplifier and centrally located transmitter with signal, non-rotating gips.

► Standard aircraft die, larger aperture and standard 100 gips.

Eclipse-Pioneer

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Most engineers look at the computer's output as "hardwood boxes." To the layman, however, the speed and accuracy of computers is an unbelievable fact that they think only of the instruments as robots.

There is no mystery to the advances in electronics (the science of computing machines and controls). The mystery (don't think but they do) compare values to problems by means of data fed into them.

To take the simple principle (but the relation of a shaft or a gear can be used to illustrate a value as a change in velocity rather than merely present inputs, and read out the final state of mechanical components, the differential adds the total revolution of two gears—an addition that the differential of two gears from the total revolution by another gear—and divides the answer by positioning a final shaft. It produces a continuous series of answers as the input



change. Other mechanical devices can multiply, divide, integrate, and solve various other mathematical problems—and combinations of these components can work out solutions to complex problems. Electrical and electronic, hydraulic, and pneumatic components can be made to do much the same, and computer components can be built by combining the components built using any one, or a physical relationship to the components at hand.

Second, engineering knowledge in these fields plus skilled technical ability to make precise parts and assemble them successfully enables several companies in the country to build these instruments.

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FINANCIAL

IRA Aviation Securities Committee Says . . .

Air Regulation Needs an Overhaul

Changes are urged to increase investor confidence in airlines: local service and courier needs stressed.

Recommendations for major overhaul of the government's regulatory process to control air transport and the same initial (history) of local service and metropolitan helicopter services as contained in a report being released by the Investment Securities Division of the Federal Reserve Bank of New York, suggested by IIRA aviation securities committee leader William B. Harding of Smith, Barney and Co., also calls for an aviation vision in the government at Cabinet level and for removal of Civil Aeronautics Board rate and profit policies. These suggestions are aimed at strengthening the national support for the industry, the report states.

Although the document contains the disclaimer that it does not necessarily represent the views of all members of the committee nor bear the endorsement of the parent IIRA, such a disclaimer is common in reports of this type.

It is no way detracts from the confidence nor minimizes the implications of the study.

Local Service—The local service carrier, charter, regional, development and present status are reviewed in detail.

The report notes:

"Somewhere the idea has become prevalent that the government is doing the aviation a favor by providing them with constant money to keep operating. Actually it is a two-way bargain. The government is purchasing a service which the country needs. This need has been demonstrated by lengthy 'line' procedures.

"If the need does not exist, the aviation industry is to reduce the service, but the tendency among the union formed . . . is to focus on reducing the payment for the service without giving full consideration to the reasons why the service was found to be necessary."

A key view is to the investment position of the local service group is contained in the report. "Despite the wish of the Board to facilitate the raising of private equity capital for the group, the results of past financing have been such as to discourage even the most enthusiastic." The low rate will continue unless "major changes in corporate regulations of the industry are effected which are adequate to improve

investor confidence," the committee declares.

Metropolitan Courier—A strong case for metropolitan helicopter services is presented, showing their contributions to the national and civil defense at relatively limited cost. Analyzing the current operations of the almost 100 existing certificated helicopter carriers, the committee concludes that expansion of existing helicopter services, and the establishment of new services "will presumably require large amounts of capital."

Present regulatory policies and procedures make sound financing extremely difficult.

The report also concludes that the intention of obtaining a "bail-out status" to the financial support received by the airlines is not sound. In contrast, it is noted, the aircraft built are also subject to government regulation and even more dependent on government financial support, but do not carry the "industry stigma" and "as a result the industry enjoys a much healthier economic status."

The report observes: "There is strong evidence that the air transport industry, taken as a whole, is not intended but, as the industry, remains a net profit to the U. S. Treasury."

Civil Act Interpretation—While the Civil Aeronautics Act of 1938 is regarded as an exceptionally fine piece of legislation and it has been effective in accomplishing the major objective of encouraging the sound development of air transportation in the U. S., the committee report says as second, years of interpretation of the act "tend to have taken on an increasingly restrictive character, to such a degree that in our opinion, the current operating services requiring government financial support are not receiving the income necessary" to sustain the operations envisioned in the act.

Investor confidence . . . is at one of the lowest points that it has been since the Civil Aeronautics Act was passed in 1938, and we believe that prompt action by the Administration and the Congress is needed to restore investor confidence in the aviation industry," the report prepared by the aviation securities committee concludes.

Chart Proposals—Three major items

Double Barreled

Two power-packed jet engines, two "decks" of 50 missiles, two sets of controls and trainers, up to five thousand miles of range . . . and the resulting assurance of single engine performance if necessary, that's the Northrop Scorpion F-69. These U. S. Air Force interceptors now stand ready for double duty duty as far-away bases, they can rise in seconds as fast order start to intercept an intruder, and they can follow, harass and destroy those hundreds of miles before they reach target. The long-range Scorpion F-69 is one of many precision products built by Northrop for all branches of the U. S. Department of Defense.



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extrusions are highlighted in the construction documents.

• **Reversion of the Civil Aeronautics Authority.** This authority should encourage all federal agencies having jurisdiction over civil aviation in their primary job, including CAB, CAA, possibly as an advisory board, and a new office to be called “Office of the Civil Air Contracts Administrator.” The report suggests that the Secretary of Commerce be chairman of the Civil Aeronautics Authority, in order that civil aviation have a voice at the Cabinet level of the government.

Creation of the Office of Civil Air Contracts Administrator is urged strongly. To the office would be transferred CAB’s rule-making actions and the Board’s responsibilities for approving payments to carriers. CAB would retain the responsibility for determining which air transport services are required in the public interest and which carriers would be authorized to render these services. CAB also would retain final jurisdiction over tariffs to be charged the traveler and the shipper (this would include the Post Office Department).

The proposed division of these responsibilities between CAB and the Civil Air Contracts Administrator will have two primary advantages. CAA, in lieu of issuing time-consuming financial orders, could expedite on other important work. The administrator would be free to give full-time direction to the financial negotiations between the carriers and the government.

• **The present system of paying subsidies at “mail pay” should be terminated.** The government should accept more a direct obligation to provide financial support for the carriers which have significant operational revenues to permit them properly to render the services which they are required to perform.

• **Instead of a series of “bargaining” and “last” offers which are counterproductive with the so-called “bidding and price” system, a single type of rate should be applied.**

This single, all-inclusive rate would include charges for profit and taxes and would be paid for all carriers as the required services are performed. Excessive earnings, if any, could be recaptured later by a negotiation procedure.

• **The use of incentive contracts is favored.** This would incorporate the principle that the contractor and the government share in savings effected by the contractor as compared with estimated costs and the contractor takes some penalty for inability to control costs.

• **Present CAB policy, which limits salaries of local agents and helicopter operators for air-landing purposes,**

should be repealed. The efficiency of the carrier should be judged on the basis of overall costs in addition to the services performed.

• **Instead of the present 5% threshold limitation on “intra-airline agreements” which, “after inevitable difficulties” lower the amount with something like “solidarity loss,” the report recommends that a scheme of local 15% after taxes be allowed. Provision for negotiations would take this down to a lower figure, but not less than 10%.**

Other recommendations deal with the effect of a carrier’s involvement in publishing of accurate competitive financial figures themselves at local level

or duplicate ratings, weights and to coordinate costs.

• **Steps Continuation.** The full measure of the recommendations advanced by this report would, if carried out, completely overhaul the present regulatory process that governs the air transport industry.

How far any of these recommendations may advance in their adoption, at this time, is subject to question. The report does make a useful constructive contribution in focusing attention on the importance of reducing and bettering aviation conditions in the nation, particularly the carrier element.

—Selig Altschul



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AVIONICS

Pioneers Sounds Warning

Transport Copters Need New Nav-Aids

• Present avionics devices held inadequate to keep delays down and allow all-weather operation.

The helicopter's unique advantages for civil transport will be seriously compromised in the future unless more rugged navigation aids designed for fixed-wing aircraft are modified or new nav-aid systems are developed.

This warning was sounded by Frank St. Pius, chairman of the board of Pirelli Helicopter Corp., speaking before the recent Philadelphia meeting of the Radio Technical Commission for Aeronautics. The paper was introduced by Harold Peterson, Pirelli engineering vice president.

One possible solution to both the helicopter's en route navigation and landing problems is the use of a light weight, short-range airborne radar, Pirelli and Peterson indicate.

• In Complete-Heli helicopters are, to compete with existing short-haul air line transportation, they must offer an all-weather service in any weather, with maximum delays on route and at airports. To meet this objective, Pirelli says • Operating altitudes must be kept to a minimum for maximum portable block space. The present operational ceiling levels must be provided for air traffic control and those using airports, except at control points, to reduce landing and takeoff delays. Pirelli recommends a 1,000 ft ceiling for the lower (enroute) level.

• Navigation systems must be sufficiently flexible to provide en route coverage between main airports as well as en route without need for instrument at each landing site.

The same philosophy applies to instrument landing aids.

• Accuracy, reliable information as both helicopter position and flight path, the ground must be provided to prevent collisions between helicopters in flight as well as with ground obstacles, such as TV towers.

• A Look at Landing—Airline-landing en route services do not meet all of these requirements, Pirelli points out. Present VORs (VHF omnirange) do not in themselves provide direct line-of-sight between helicopters located at the same runway. A course line emergency (such as Colson NC-101) can provide the off-airways navigation



COPTER'S ADVANTAGES for civil air traffic will be seriously compromised unless suitable navigation aids (shown) are developed for aircraft, declares Frank Pirelli. Airco's concept rotor copter shows landing on rooftop landing in heart of city.

using two VORs or one VOR and DME.

However, when VOR stations are located some distance from helports, the resulting accuracy is not sufficient for all operations, Pirelli says. Limited range of low-cost, low-power TVORs at such helports would solve this problem, but is costly, he claims and is one of the unattractive VHF spectrum.

The use of light propagation of VOR (low VHF communication) poses a problem for low flying helicopters. For example, at a distance of 50 miles, VOR signals cannot be received consistently by a helicopter flying at altitudes under 1,000 ft. Low frequency radio ranges are usable at lower altitudes (down to 500 ft) but they lack accuracy and reliability during storms.

• TACAN—The new military TACAN aids and system (Aviation Week Dec. 7, 1953, p. 48) has the same off-airport and line-of-sight limitations as VOR, so it offers no solution. Pirelli points out.

The British Decca and Meitner systems (see Dec. 7, 1953, p. 48) (phase-comparison) systems show promise of receiving positioning and not needing a large area of continuous cover. With secondary cover points, these systems would permit any number of all-weather routes, Pirelli says. However, both systems operate in the same frequency where some interference may be a problem.

• Airborne Radar the Solution—"Non-pilot" by (airborne) radar alone may be the ultimate solution," Pirelli says. However, distance limits factors are lacking, radar reflects and becomes difficult to install on the ground to provide line-of-sight.

Airborne radar can also be used to prevent collisions between helicopters, which often provide a good radar target. It would also be useful to spot large ground obstructions. Smaller obstructions, such as TV towers, could be made to provide a good radar target by reflecting radar beams on them. The ground return could be an airborne radar range also provides a rough indication of height above the ground.

Although Pirelli did not mention them, the new light aircraft radar which Radar and RCA are developing for the services are possible candidates for helicopter use.

• Airborne Radar—The new light aircraft radar which Radar and RCA are developing for the services are possible candidates for helicopter use.

• Also for Landing—Airborne radar can be used for the landing and taking-off, permitting an infinite number of approach paths and angles for instrument landings. Radar would be particularly handy for military helicopters which make frequent landings where there are no ground terminal aids (small radio reflectors or a beacon

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2000 SEC. High radar with 20-mi. of air search display.

FOUR-WAY RADAR—New low-cost airport radar, such as Giffith's Quadradar, and Lufthansa's computerized model had no in-helicopter search. That's because these low Quadradar can be switched quickly to any one of four different ground radar functions—air surveillance, precision approach, airport field surveillance, height finder—in less than five seconds.

would be visible on the ground to deactivate the landing area. Reflections, which can be collapsed for portability, are relatively inexpensive.)

It may be desirable to provide some means for the airborne radar to "lock on" the ground radar reflectors or beams to furnish the pilot with an all-time instrument indication by showing landing course and descent path. Possible below.

This feature could be achieved by adding "track while scan" provisions at some expense in weight and complexity, industry sources say.

Ground-Controlled Approach—Precision radar ground radar with some major problems because of the "early cancellation at every landing site, with its constant operation." However, GCA would relieve the helicopter of carrying radar equipment, a boon to its payload performance.

Parsons made no mention of recent "port radar" GCA developments here and in England. The report was prepared before the two U. S. entries by Lab for Electronics and Giffith were announced (Aviation Week May 3, p. 34, item 3, p. 71).

Both the Lab for Electronics SRAR and the Giffith Quadradar sell for around \$40,000 (approximately one-fifth the installed cost of a full-scale GCA) and they require only a single operator. The latter, which is quicker, is intended to save several different systems in it is conceivable that one installation might be able to serve several nearby heliports.

The Giffith unit provides both air search and surveillance radar views, and the LUF can be modified to do so. Thus the equipment could be used to provide traffic control in addition to their instrument landing service.

Traffic Control—Radar monitoring may be required at high-density areas and not exclusively by the precision approach by which the traffic controller will direct traffic. Possible below. Search radar must be able to "see" a helicopter flying at 500 ft. altitude at least 25 miles out, and preferably at distances of 50 miles.

GCA equipped with moving target indicator (MTI) provision, which filters out stationary objects to present ground clutter, has difficulty "seeing" a hovering helicopter because of its rotating blades. Possible notes:

Communication Problems—VHF and UHF communication between traffic controller and helicopter reduces the same line of sight limitations as VOR. Low-flying helicopters will have difficulty in contacting traffic control centers 50 or more miles away. For this reason, radio stations may be needed.

New York Airways recently took steps to solve an associated problem which Parsons notes communication with helicopters while they are on the ground. NYA's solution was to install a 150-watt VHF transmitter atop the Chrysler Building.

Rotor Modulation—The helicopter's rotating blades introduce interference known as rotor modulation in the HF, VHF, and UHF bands. This is caused by its rotation from the metal in the rotor blades. However, evidence to date suggests that rotor modulation is not a problem at lower frequencies.

The rotor causes amplitude modulation of the RF carrier. The modulation frequency determined by rotor rpm, at usually in the region of 10-12 cps, with harmonics (especially a strong third harmonic) extending up to 30-40 cps. Possible note: Whether or not rotor modulation is a problem in communications depends upon whether the receiver will pass these low audio frequencies.

Major Problem With VOR—Rotor modulation is a major problem in the navigation systems, such as VOR, in local bearing devices, where reflections are transmitted at a frequency near the rotor modulation frequency, as do harmonics—the variable phase VOR bearing signal drops at a 30-cps frequency.

At the recent Dayton conference, the Center for the Study of the National Test Center reported an investigation of rotor modulation effects on VOR. NATC found that rotor modulation caused by the cross-bearing, indicating a need for a search range of 120 deg., and produced continuous looking of the indicator warning flag and partial marking of the "no trace" indicator over part of the indication period.

Body Antenna Tips—By locating VOR and VHF antennas on the underside of the fuselage, rotor modulation can be reduced, but at the expense of communication equipment problems arise when the helicopter is on the ground. Possible points out.

NATC's investigation indicated that the lower forward position is the optimum VOR receiver location. In this position, Gaining reported, some modulation was only 510%, compared to as much as 30% in other locations. Another contributing type of rotor interference is caused by vibrations on rotor rpm. Gaining said:

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Pushing further into the realm of supersonic flight, two J34 turbojets with afterburners are pioneering the use of jet power plants for sustained, high-speed flight.

J34 axial-flow turbojets were chosen to power the X-3 because of important features such as small engine diameter and high thrust-to-weight ratios which permitted the use of two engines to provide excellent high-speed performance combined with multi-engine reliability.

Westinghouse experience and technology are demanded at the successful conquest of aviation frontiers. Continuing advancements mean your aircrafts no matter what the aerodynamic design or weapons systems application might be. Let Westinghouse help you bring tomorrow's aircraft... One Step Closer. Westinghouse Electric Corporation, 3 Gladway Center, P. O. Box 566, Pittsburgh 30, Pa. 15201.

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Specs for Copter Nav-Aids

A new aid system to meet the operational needs of helicopters should permit the following characteristics, according to Frank N. Farns, and Edward Pivonia:

ROUTE SYSTEM

- Sufficient accuracy for straight open terrain to enable pilot to hold horizontal position within a 100 ft. vertical position within a 150 ft. at distance out to 75 miles.
- Service at all altitudes from the ground up to level of sight limitations, other than the effects of atmospheric disturbances.
- Easily interpreted information to pilot on instruments when use does not use precision navigational capability.
- Automatic pilot coupling for con-

stantly blind landings and long-range mission.

TERMINAL AREA SYSTEM

- Approach and between from one direction with a wide element of glideslope angles.
- Accuracy sufficient to permit safe approach under maximum conditions.
- Coupling to this system must be possible anytime, rapid transition from one to the other.

ANTI-COLLISION & SEARCH RADAR

- Useful range of at least 50 miles. For long-range search radars, table should have search range of 100 miles, between range of 150 miles.
- Modes for tracking directly to a destination and extending an instrument lead down, as well as short and long-range search.

6-Pen Data Recorder Has 16 Chart Speeds

A new multifunction chart-writing recorder, with an electrically controlled chart drive system which permits instantaneous selection of any one of 16 chart speeds between 1 and 250 in./sec., is one of several recently announced devices suitable for flight test and laboratory instrumentation.

The new recorder, providing either four or ten channels with dichrochromic penmanometers capable of recording up to 100 cps, phenomena is available from Brook Electronics Co., Equipment Dept. R7-1, 3605 Parkview Ave., Cleveland 14, Ohio.

Other new instrumentation devices:

- **UHF power amplifier**, for helicopter, covers range of 215-215 mc., provides 15 watts output with 1.5 watt input. Unit measures 4x10x10 in. It is designed to withstand rigors of missile environments. Rikom Manufacturing Co., Research & Development Labs, 9136 East 84th Road, Downey, Calif.
- **Linear accelerometer**, lightweight, controlled for operation between -50F and 120F, are available in units covering the ranges of $\pm 0.5G$ to $\pm 16G$. An accelerometer output signal is generated by an unbalanced constant strain gage. Designing unit is approximately .37

Statham Electronics, Inc., 12400 W. (Chrysler Bldg.), Los Angeles 64, Calif.

• **Pressure transducer**, Series P160, for helicopter use, covers 0 to 100 psi. It is designed to withstand pressures over range of 0 to 1 to 1,000 psi. Sealed transducer has a variable inductance output for feeding electronic-controlled bridge transducer.

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Industry Please Note!

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New Equipment For Avionic Labs

Two new transceiver amplifiers, which typically operate 10-15 db gain over the 1 to 4 kHz band, are among recently announced equipment suitable for use in electronic laboratories.

Model 494A, featuring noise amplifier can be used for all types of high gain, broadband low noise amplification. Model 494A provides a full gain output power. Operating open are available from Hewlett-Packard Co., Dept. P, 395 Page Mill Road, Palo Alto, Calif. Offer now lab device.

• Sweep generators Type 2144-01 for the range 225 to 425 mc. Type 2144-02 for the range 470 to 895 mc. and Type 2144-03 for the range 1,215 to 2,175 mc., each cover four independent bands at a single sweep without tuning.

Self-contained positive marker, calibrated in 1-sec. steps, provides frequency reference stable to within 1 mc. in low range and 2 mc. in high range unit. Unit has 70-ohm output impedance with a noise VSWR of 1.25 or less. Amplitude linearity is reportedly controlled to within 1 db and pulse output is 30 ohms. Manufacturer:

is Kallman Instrument Corp., 30-08 49th Ave., Flushing, N. Y.

• **Frequency wave analyzer**, Model 20, is for continuous coverage of frequency band of 50 cps to 50 mc. Manufacturer says that a 91% second harmonic at 100 cps can be measured with less than 5% error. Densco Scientific Co., 2475 Seventh St., Berkeley 16, Calif.

• **Electronic generator**, Model 402, delivers 500 wa. of power at a frequency of 50 to 6,000 cps (a few frequency range), at a voltage of 50 to 175, or 100 to 270. Distortion is quoted as less than 5% at full load, voltage regulation at 2% from no load to full load. Manufacturer is Chromatronics Manufacturing Lab., Inc., 150 Lehigh Ave., Springfield, N. J.

• **Video phase meter**, Type 124-A, provides direct reading of phase angle to 360 degrees over the frequency range of 20 cps to 100 cps, or down as low as 20 cps on special order. Angle phase measurement is quoted as 1 degree under 4 degrees for either one or complex waves having only one positive-going zero crossing per cycle. Phase measurement accuracy is quoted at 1 deg. for non-mutual frequencies up to 10 deg. Manufacturer is Technology Instrument Corp., Acton, Mass.



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New Power Supply Unit Has Low Ripple

A new d.c. power supply, with regulation quoted at 1:101%, ripple at less than 100 mv, is one of several recently announced power supplies suitable for laboratory use. The new Model UHR-220, can provide 0-200 ma., at 0-500 v., with the 1:101% regulation over a line voltage range of 105-125 v. a.c., according to Koolha-Hair Instrument Co.

Company gives transient response of 0.001 milliseconds, d.c. impedance of less than 0.05 ohms, and an a.c. impedance less than 0.1 ohm in series with 0.1 microhm of inductance, corresponding to four inches of wire. Unit can supply an additional negative source of 0-5 ma., at 0-150 v., with less than 2mv ripple. Company address: 550 Main Ave., Cambridge 38, Mass.

Other new power supplies:

• **Regulator, Model 711B**, reportedly offers 0.01% regulation, one millisecond transient response, less than 500 microhm supply. Device offers four output options: 0-200 v. d.c., 200 ma. regulated, fixed—500 v. regulated which may be connected in series with 500 v. supply to provide 50 ma., 500-600 v. for kilovolt 10 amp. a.c. unregulated, and continuously variable 0-150 regulated bias voltage. Manufacturer: Fluke-Pecked Co., Dept. P, 995 Page Mill Road, Palo Alto, Calif.

• **Shay's supply, Model K101F**, can provide continuously variable 0-25 v.d.c., up to 36 amps., operates from 115 v., 60 cycles. Ripple reportedly is under 1%, Unit can withstand 100% overload for 2 minutes, 400% overload for 1/2 min.



Small 2-Way VHF

Compact two-way VHF station for mobile airports, can provide ground-to-air communications on 122.9 mc. (visual advisory frequency), 121.7 or 121.9 mc. (ground-to-air mobile). Crystal-controlled transmitter is rated at 7 watts, superb accuracy across 145 to 125 mc. Includes frequency speaker. Equipment weighs 25 lb., operates from 5 v. d.c. and 115 v. a.c. Manufacturer is Gossink Co., 301 S. Main St., Berkeley Calif.

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Four streamlined Pratt & Whitney Aircraft J-57 turbo-jet engines in line along fuselage will push Boeing's new 707 jet tanker-transport prototype to cruising speeds of 550 miles an hour and to altitudes in the 40,000-foot range.



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Boeing's first jet transport, the 707, rolled out of the Boeing plant in Everett, Washington, on May 15, 1954. The Pratt & Whitney-powered 707 is a prototype for high-speed military tankers or commercial airliners.

New Boeing Tanker-Transport Powered by J-57 Engines

America's first jet transport, the Boeing 707, has been revealed. In many ways this event is one of the most interesting in modern aviation history.

Here is a completely new transport designed around the most powerful jet engines now in production in the United States. With its four Pratt & Whitney Aircraft J-57s, the new transport has four times as much power as any commercial American airplane now flying. As a military tanker, it will be able to refuel

thirty jet fighters and bombers at their speed and altitude enroute to any distant target. Or it will cruise on the 6000-to-8000-hour class carrying 80 to 120 passengers non-stop coast-to-coast or across the Atlantic.

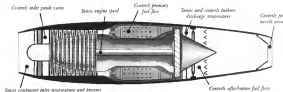
In this great new tanker-transport prototype, as well as in many of the latest Air Force and Navy combat airplanes, Pratt & Whitney Aircraft's J-57 engine is fully justifying the long years and intensive effort required for its development and production.

Pratt & Whitney Aircraft

MAIN OFFICE AND PLANT, EAST HARTFORD, CONNECTICUT • BRANCH PLANTS, NORTH AVENUE, SOUTHINGTON, ILLINOIS
In Canada: Canadian Pratt & Whitney Aircraft Co., Ltd.

A 10-MILE HEAD START

Here's what the new Honeywell system does



Today's most powerful, most complex jet engines require a control system that is truly sophisticated. The new Honeywell electro-mechanical control system is the first system to meet this need. To put it into operation, a pilot merely advances the throttle to the desired power setting. Each individual engine variable has a wide range, and yet at a given altitude, speed and power setting, only one combination will give optimum efficiency. But they give power setting the Honey-

well Control will provide a precise percentage of available thrust. Derived from the master system are seven sub-systems and components which may be adjusted and modified to meet specific engine needs if a problem does not call for the complete system. These are the jet Nozzle Area Control, Temperature Over Heat System, Temperature Trim Control, Temperature Lockdown System, Inlet Guide Vane Control System, All-Speed Inlet and Hydraulic Servo Valve.

Honeywell engineers were able to draw on years of experience in computer, apparatus, design, testing and production. The new equipment shown here was used in consultation with the company in all

The essential parts of the system are a stack up of six major sub-systems: engine speed components, jet nozzle area, temperature, pressure, and altitude, all for optimum, full control settings background.

The most thorough electronic testing equipment ever (below) in engine control laboratory were considered on the new Honeywell jet engine control system. It is now being given extensive tests by the Air Force.



Now—with the new Honeywell jet engine control

FOR OUR JET FIGHTERS

New Honeywell electro-mechanical control system gets jets off the ground faster, makes them super-performers in the air

How far from the target sees our fighters the next? The answer to this question is a vital factor in determining the success of a jet fighter defense.

Every mile such distance can be increased in a crucial mile. Which is a reason why development of the new Honeywell jet engine control system is important.

This system will make it possible for our jets to start faster—get into the air 30 to 45 seconds sooner than with any other control system. With this head start, our jets will be able to meet superior attacks 10 miles further out. That's what a few seconds advantage means at jet speeds.

The new Honeywell jet engine control is a coordinated electronic electro-mechanical system. It adjusts the speed and sensitivity of dozens of computers to perform the mechanical control elements of the engine.

Beside speeding take-off, it controls the functioning of a jet engine in flight in much the same way the nervous system controls the human body—coordinating, adjusting, making use of proper expansion under constantly changing conditions.

Making America strong in the air

We believe our contribution to America's position in the air comes on two special abilities. The ability to design the necessary complex control systems which today is nearly unique. And the ability to produce these systems in quantities at a level of world-class quality of components parts which were formerly the province of engine manufacturers, the most advanced, and American suppliers.

In our 100,000 square feet of plant space 3,000 engineers, scientists, technicians and skilled craftsmen work in the



How the new Honeywell system controls all jet engine variables in flight—with the diagram at left.

First completely packaged electro-mechanical system

Computers were engineered to work together as a system. No longer will engine builders have to piece together "hybrid" systems from components of various firms. Components of various firms are coordinated within the engine, it can give more accurate control and faster response than any purely mechanical system.

Weighing under 70 pounds, the new Honeywell system is a flexible system adaptable to any turbo jet engine. It offers maximum reliability through the use of rugged magnetic amplifiers. It also will compensate for wear over the life of an engine by continuously noting and correcting for wear and changes to provide optimum performance. It can be easily maintained because components are interchangeable.

If you'd like full details on the new jet engine control system, write us on your business letterhead at the address given below.

job of producing fine Honeywell electronic controls and delivering them faster than ever. We would like to put this point of skill to work for you.

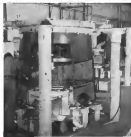
Controls for everything that flies

Beside jet engine controls, Honeywell produces a complete line of jet engine controls, electronic engine data, electronic and fluid wing controls, electronic engine data measurement systems, power controls, electronic engine data, electronic amplifiers, valves and servos.

MINNEAPOLIS
Honeywell
Aeronautical Division

3600 Ridgway Road, Minneapolis 15, Minnesota





FIT-MOUNTED JIG for forward fuselage work floor space



HALF-SHELL fuselage station speed equipment installation

All-Weather Scorpions Roll Off Line



SCORPION F-5D cruises south of 104 across 375 in. wheels in wing tip pods

These views show major activities along Northrop Aircraft Inc.'s production line, where Scorpion F-5Ds are being turned out for assignment to squadrons of Air Defense and Airborne Air Command.

Final assembly line for the two-seater all-weather interceptor is only 518 ft long, less but 11 stations. Northrop's production reports have advanced sub-assembled parts in assembly units by several days, detailed operations in subassembly and major subassembly units.



FUSelage PICK-UP WORK takes place in three areas



EMPHASIS is laid to body with overhead conveyor



STARBOARD HALF-SHELL is lowered into primary jig for mating with other half of fuselage. Complete electrical installation was filled in subassembly stations

Then, wings each had assembly with the control surfaces, landing gear doors and internal components installed. Fan passage makes the final line with tail surfaces and airframe, main installed fuselage half shells are fitted with electrical and mechanical equipment before joining.

Flare area has a high refinement through use of jet-mounted jigs, double deck, semi and double purpose jigs.

Assembly materials are stocked right on the line, with less put a step away whenever possible.

At the present time, Northrop is installing a large Scorpion stretch plant, and by the company to be located on the West Coast. The new machine will be treated with automatic mating equipment now in use.



WING internal and external sections are joined in this jig where drilling is done



AUGUST COMPLETE, F-5Ds will along first line. Rocket pod area are correct

Engineers and Physicists

to conduct classroom and laboratory educational programs involving advanced systems work in the fields of radar fire control, electronic computers and guided missiles

Advanced electronics in the field where greatest advancements are being made, because of military emphasis. Development in these highly active areas will be in creating systems of guidance in Electronic Engineering, or Physics, with computer electronics in radar, radio fire control systems, electronic computers, and other military electronic devices and equipment.

At Hughes Research and Development Laboratories in South Plainfield, engineers assigned to this project are members of the Technical Staff. In training engineers they conduct Hughes equipment courses and advanced courses, within the Laboratories for both military personnel and in getting field engineers.

Price is engineering, engineers participate in a technical training program to become familiar with basic Hughes equipment. Many times guidance courses on the Computer Laboratory are available in nearby universities.

Scientific and Engineering Staff

Hughes

RESEARCH AND DEVELOPMENT LABORATORIES

Delmar City, Los Angeles, Glendale, Culver City

Advanced Electronics Division, Hughes Aircraft Company, Los Angeles, California

Japanese Beechcrafts

The National Safety Forces of Japan selected the Beechcraft T-34 (Mustang) as their standard basic trainer.

The first of these are flying in Japanese skies now, and additional quantities will be built in Japan to supply the new squadrons of our allies in the Far East.

Beechcrafters are proud to have their own T-34 selected for this purpose.



Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

The Beechcraft T-34A is now in production for the U.S. & U.S. and the military version of Beechcraft's large program.

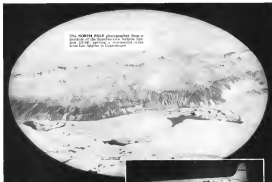
Beech Models: B-57F, B-57C, B-57D, B-57E, B-57F, B-57G, B-57H, B-57I, B-57J, B-57K, B-57L, B-57M, B-57N, B-57O, B-57P, B-57Q, B-57R, B-57S, B-57T, B-57U, B-57V, B-57W, B-57X, B-57Y, B-57Z, B-57AA, B-57AB, B-57AC, B-57AD, B-57AE, B-57AF, B-57AG, B-57AH, B-57AI, B-57AJ, B-57AK, B-57AL, B-57AM, B-57AN, B-57AO, B-57AP, B-57AQ, B-57AR, B-57AS, B-57AT, B-57AU, B-57AV, B-57AW, B-57AX, B-57AY, B-57AZ, B-57BA, B-57BB, B-57BC, B-57BD, B-57BE, B-57BF, B-57BG, B-57BH, B-57BI, B-57BJ, B-57BK, B-57BL, B-57BM, B-57BN, B-57BO, B-57BP, B-57BQ, B-57BR, B-57BS, B-57BT, B-57BU, B-57BV, B-57BW, B-57BX, B-57BY, B-57BZ, B-57CA, B-57CB, B-57CC, B-57CD, B-57CE, B-57CF, B-57CG, B-57CH, B-57CI, B-57CJ, B-57CK, B-57CL, B-57CM, B-57CN, B-57CO, B-57CP, B-57CQ, B-57CR, B-57CS, B-57CT, B-57CU, B-57CV, B-57CW, B-57CX, B-57CY, B-57CZ, B-57DA, B-57DB, B-57DC, B-57DD, B-57DE, B-57DF, B-57DG, B-57DH, B-57DI, B-57DJ, B-57DK, B-57DL, B-57DM, B-57DN, B-57DO, B-57DP, B-57DQ, B-57DR, B-57DS, B-57DT, B-57DU, B-57DV, B-57DW, B-57DX, B-57DY, B-57DZ, B-57EA, B-57EB, B-57EC, B-57ED, B-57EE, B-57EF, B-57EG, B-57EH, B-57EI, B-57EJ, B-57EK, B-57EL, B-57EM, B-57EN, B-57EO, B-57EP, B-57EQ, B-57ER, B-57ES, B-57ET, B-57EU, B-57EV, B-57EW, B-57EX, B-57EY, B-57EZ, B-57FA, B-57FB, B-57FC, B-57FD, B-57FE, B-57FF, B-57FG, B-57FH, B-57FI, B-57FJ, B-57FK, B-57FL, B-57FM, B-57FN, B-57FO, B-57FP, B-57FQ, B-57FR, B-57FS, B-57FT, B-57FU, B-57FV, B-57FW, B-57FX, B-57FY, B-57FZ, B-57GA, B-57GB, B-57GC, B-57GD, B-57GE, B-57GF, B-57GG, B-57GH, B-57GI, B-57GJ, B-57GK, B-57GL, B-57GM, B-57GN, B-57GO, B-57GP, B-57GQ, B-57GR, B-57GS, B-57GT, B-57GU, B-57GV, B-57GW, B-57GX, B-57GY, B-57GZ, B-57HA, B-57HB, B-57HC, B-57HD, B-57HE, B-57HF, B-57HG, B-57HH, B-57HI, B-57HJ, B-57HK, B-57HL, B-57HM, B-57HN, B-57HO, B-57HP, B-57HQ, B-57HR, B-57HS, B-57HT, B-57HU, B-57HV, B-57HW, B-57HX, B-57HY, B-57HZ, B-57IA, B-57IB, B-57IC, B-57ID, B-57IE, B-57IF, B-57IG, B-57IH, B-57II, B-57IJ, B-57IK, B-57IL, B-57IM, B-57IN, B-57IO, B-57IP, B-57IQ, B-57IR, B-57IS, B-57IT, B-57IU, B-57IV, B-57IW, B-57IX, B-57IY, B-57IZ, B-57JA, B-57JB, B-57JC, B-57JD, B-57JE, B-57JF, B-57JG, B-57JH, B-57JI, B-57JJ, B-57JK, B-57JL, B-57JM, B-57JN, B-57JO, B-57JP, B-57JQ, B-57JR, B-57JS, B-57JT, B-57JU, B-57JV, B-57JW, B-57JX, B-57JY, B-57JZ, B-57KA, B-57KB, B-57KC, B-57KD, B-57KE, B-57KF, B-57KG, B-57KH, B-57KI, B-57KJ, B-57KL, B-57KM, B-57KN, B-57KO, B-57KP, B-57KQ, B-57KR, B-57KS, B-57KT, B-57KU, B-57KV, B-57KW, B-57KX, B-57KY, B-57KZ, B-57LA, B-57LB, B-57LC, B-57LD, B-57LE, B-57LF, B-57LG, B-57LH, B-57LI, B-57LJ, B-57LK, B-57LL, B-57LM, B-57LN, B-57LO, B-57LP, B-57LQ, B-57LR, B-57LS, B-57LT, B-57LU, B-57LV, B-57LW, B-57LX, B-57LY, B-57LZ, B-57MA, B-57MB, B-57MC, B-57MD, B-57ME, B-57MF, B-57MG, B-57MH, B-57MI, B-57MJ, B-57MK, B-57ML, B-57MM, B-57MN, B-57MO, B-57MP, B-57MQ, B-57MR, B-57MS, B-57MT, B-57MU, B-57MV, B-57MW, B-57MX, B-57MY, B-57MZ, B-57NA, B-57NB, B-57NC, B-57ND, B-57NE, B-57NF, B-57NG, B-57NH, B-57NI, B-57NJ, B-57NK, B-57NL, B-57NM, B-57NN, B-57NO, B-57NP, B-57NQ, B-57NR, B-57NS, B-57NT, B-57NU, B-57NV, B-57NW, B-57NX, B-57NY, B-57NZ, B-57OA, B-57OB, B-57OC, B-57OD, B-57OE, B-57OF, B-57OG, B-57OH, B-57OI, B-57OJ, B-57OK, B-57OL, B-57OM, B-57ON, B-57OO, B-57OP, B-57OQ, B-57OR, B-57OS, B-57OT, B-57OU, B-57OV, B-57OW, B-57OX, B-57OY, B-57OZ, B-57PA, B-57PB, B-57PC, B-57PD, B-57PE, B-57PF, B-57PG, B-57PH, B-57PI, B-57PJ, B-57PK, B-57PL, B-57PM, B-57PN, B-57PO, B-57PP, B-57PQ, B-57PR, B-57PS, B-57PT, B-57PU, B-57PV, B-57PW, B-57PX, B-57PY, B-57PZ, B-57QA, B-57QB, B-57QC, B-57QD, B-57QE, B-57QF, B-57QG, B-57QH, B-57QI, B-57QJ, B-57QK, B-57QL, B-57QM, B-57QN, B-57QO, B-57QP, B-57QQ, B-57QR, B-57QS, B-57QT, B-57QU, B-57QV, B-57QW, B-57QX, B-57QY, B-57QZ, B-57RA, B-57RB, B-57RC, B-57RD, B-57RE, B-57RF, B-57RG, B-57RH, B-57RI, B-57RJ, B-57RK, B-57RL, B-57RM, B-57RN, B-57RO, B-57RP, B-57RQ, B-57RR, B-57RS, B-57RT, B-57RU, B-57RV, B-57RW, B-57RX, B-57RY, B-57RZ, B-57SA, B-57SB, B-57SC, B-57SD, B-57SE, B-57SF, B-57SG, B-57SH, B-57SI, B-57SJ, B-57SK, B-57SL, B-57SM, B-57SN, B-57SO, B-57SP, B-57SQ, B-57SR, B-57SS, B-57ST, B-57SU, B-57SV, B-57SW, B-57SX, B-57SY, B-57SZ, B-57TA, B-57TB, B-57TC, B-57TD, B-57TE, B-57TF, B-57TG, B-57TH, B-57TI, B-57TJ, B-57TK, B-57TL, B-57TM, B-57TN, B-57TO, B-57TP, B-57TQ, B-57TR, B-57TS, B-57TT, B-57TU, B-57TV, B-57TW, B-57TX, B-57TY, B-57TZ, B-57UA, B-57UB, B-57UC, B-57UD, B-57UE, B-57UF, B-57UG, B-57UH, B-57UI, B-57UJ, B-57UK, B-57UL, B-57UM, B-57UN, B-57UO, B-57UP, B-57UQ, B-57UR, B-57US, B-57UT, B-57UU, B-57UV, B-57UW, B-57UX, B-57UY, B-57UZ, B-57VA, B-57VB, B-57VC, B-57VD, B-57VE, B-57VF, B-57VG, B-57VH, B-57VI, B-57VJ, B-57VK, B-57VL, B-57VM, B-57VN, B-57VO, B-57VP, B-57VQ, B-57VR, B-57VS, B-57VT, B-57VU, B-57VV, B-57VW, B-57VX, B-57VY, B-57VZ, B-57WA, B-57WB, B-57WC, B-57WD, B-57WE, B-57WF, B-57WG, B-57WH, B-57WI, B-57WJ, B-57WK, B-57WL, B-57WM, B-57WN, B-57WO, B-57WP, B-57WQ, B-57WR, B-57WS, B-57WT, B-57WU, B-57WV, B-57WW, B-57WX, B-57WY, B-57WZ, B-57XA, B-57XB, B-57XC, B-57XD, B-57XE, B-57XF, B-57XG, B-57XH, B-57XI, B-57XJ, B-57XK, B-57XL, B-57XM, B-57XN, B-57XO, B-57XP, B-57XQ, B-57XR, B-57XS, B-57XT, B-57XU, B-57XV, B-57XW, B-57XX, B-57XY, B-57XZ, B-57YA, B-57YB, B-57YC, B-57YD, B-57YE, B-57YF, B-57YG, B-57YH, B-57YI, B-57YJ, B-57YK, B-57YL, B-57YM, B-57YN, B-57YO, B-57YP, B-57YQ, B-57YR, B-57YS, B-57YT, B-57YU, B-57YV, B-57YW, B-57YX, B-57YY, B-57YZ, B-57ZA, B-57ZB, B-57ZC, B-57ZD, B-57ZE, B-57ZF, B-57ZG, B-57ZH, B-57ZI, B-57ZJ, B-57ZK, B-57ZL, B-57ZM, B-57ZN, B-57ZO, B-57ZP, B-57ZQ, B-57ZR, B-57ZS, B-57ZT, B-57ZU, B-57ZV, B-57ZW, B-57ZX, B-57ZY, B-57ZZ.

USAF Contracts

Following is a list of recent USAF contracts awarded by Air Materiel Command:

Charles Beeler Co., 11 E. 1st Ave., Nevada 3, N. 2, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th, 101st, 102nd, 103rd, 104th, 105th, 106th, 107th, 108th, 109th, 110th, 111th, 112th, 113th, 114th, 115th, 116th, 117th, 118th, 119th, 120th, 121st, 122nd, 123rd, 124th, 125th, 126th, 127th, 128th, 129th, 130th, 131st, 132nd, 133rd, 134th, 135th, 136th, 137th, 138th, 139th, 140th, 141st, 142nd, 143rd, 144th, 145th, 146th, 147th, 148th, 149th, 150th, 151st, 152nd, 153rd, 154th, 155th, 156th, 157th, 158th, 159th, 160th, 161st, 162nd, 163rd, 164th, 165th, 166th, 167th, 168th, 169th, 170th, 171st, 172nd, 173rd, 174th, 175th, 176th, 177th, 178th, 179th, 180th, 181st, 182nd, 183rd, 184th, 185th, 186th, 187th, 188th, 189th, 190th, 191st, 192nd, 193rd, 194th, 195th, 196th, 197th, 198th, 199th, 200th, 201st, 202nd, 203rd, 204th, 205th, 206th, 207th, 208th, 209th, 210th, 211st, 212nd, 213th, 214th, 215th, 216th, 217th, 218th, 219th, 220th, 221st, 222nd, 223rd, 224th, 225th, 226th, 227th, 228th, 229th, 230th, 231st, 232nd, 233rd, 234th, 235th, 236th, 237th, 238th, 239th, 240th, 241st, 242nd, 243rd, 244th, 245th, 246th, 247th, 248th, 249th, 250th, 251st, 252nd, 253rd, 254th, 255th, 256th, 257th, 258th, 259th, 260th, 261st, 262nd, 263rd, 264th, 265th, 266th, 267th, 268th, 269th, 270th, 271st, 272nd, 273rd, 274th, 275th, 276th, 277th, 278th, 279th, 280th, 281st, 282nd, 283rd, 284th, 285th, 286th, 287th, 288th, 289th, 290th, 291st, 292nd, 293rd, 294th, 295th, 296th, 297th, 298th, 299th, 300th, 301st, 302nd, 303rd, 304th, 305th, 306th, 307th, 308th, 309th, 310th, 311st, 312nd, 313th, 314th, 315th, 316th, 317th, 318th, 319th, 320th, 321st, 322nd, 323rd, 324th, 325th, 326th, 327th, 328th, 329th, 330th, 331st, 332nd, 333rd, 334th, 335th, 336th, 337th, 338th, 339th, 340th, 341st, 342nd, 343rd, 344th, 345th, 346th, 347th, 348th, 349th, 350th, 351st, 352nd, 353rd, 354th, 355th, 356th, 357th, 358th, 359th, 360th, 361st, 362nd, 363rd, 364th, 365th, 366th, 367th, 368th, 369th, 370th, 371st, 372nd, 373rd, 374th, 375th, 376th, 377th, 378th, 379th, 380th, 381st, 382nd, 383rd, 384th, 385th, 386th, 387th, 388th, 389th, 390th, 391st, 392nd, 393rd, 394th, 395th, 396th, 397th, 398th, 399th, 400th, 401st, 402nd, 403rd, 404th, 405th, 406th, 407th, 408th, 409th, 410th, 411st, 412nd, 413th, 414th, 415th, 416th, 417th, 418th, 419th, 420th, 421st, 422nd, 423rd, 424th, 425th, 426th, 427th, 428th, 429th, 430th, 431st, 432nd, 433rd, 434th, 435th, 436th, 437th, 438th, 439th, 440th, 441st, 442nd, 443rd, 444th, 445th, 446th, 447th, 448th, 449th, 450th, 451st, 452nd, 453rd, 454th, 455th, 456th, 457th, 458th, 459th, 460th, 461st, 462nd, 463rd, 464th, 465th, 466th, 467th, 468th, 469th, 470th, 471st, 472nd, 473rd, 474th, 475th, 476th, 477th, 478th, 479th, 480th, 481st, 482nd, 483rd, 484th, 485th, 486th, 487th, 488th, 489th, 490th, 491st, 492nd, 493rd, 494th, 495th, 496th, 497th, 498th, 499th, 500th, 501st, 502nd, 503rd, 504th, 505th, 506th, 507th, 508th, 509th, 510th, 511st, 512nd, 513th, 514th, 515th, 516th, 517th, 518th, 519th, 520th, 521st, 522nd, 523rd, 524th, 525th, 526th, 527th, 528th, 529th, 530th, 531st, 532nd, 533rd, 534th, 535th, 536th, 537th, 538th, 539th, 540th, 541st, 542nd, 543rd, 544th, 545th, 546th, 547th, 548th, 549th, 550th, 551st, 552nd, 553rd, 554th, 555th, 556th, 557th, 558th, 559th, 560th, 561st, 562nd, 563rd, 564th, 565th, 566th, 567th, 568th, 569th, 570th, 571st, 572nd, 573rd, 574th, 575th, 576th, 577th, 578th, 579th, 580th, 581st, 582nd, 583rd, 584th, 585th, 586th, 587th, 588th, 589th, 590th, 591st, 592nd, 593rd, 594th, 595th, 596th, 597th, 598th, 599th, 600th, 601st, 602nd, 603rd, 604th, 605th, 606th, 607th, 608th, 609th, 610th, 611st, 612nd, 613th, 614th, 615th, 616th, 617th, 618th, 619th, 620th, 621st, 622nd, 623rd, 624th, 625th, 626th, 627th, 628th, 629th, 630th, 631st, 632nd, 633rd, 634th, 635th, 636th, 637th, 638th, 639th, 640th, 641st, 642nd, 643rd, 644th, 645th, 646th, 647th, 648th, 649th, 650th, 651st, 652nd, 653rd, 654th, 655th, 656th, 657th, 658th, 659th, 660th, 661st, 662nd, 663rd, 664th, 665th, 666th, 667th, 668th, 669th, 670th, 671st, 672nd, 673rd, 674th, 675th, 676th, 677th, 678th, 679th, 680th, 681st, 682nd, 683rd, 684th, 685th, 686th, 687th, 688th, 689th, 690th, 691st, 692nd, 693rd, 694th, 695th, 696th, 697th, 698th, 699th, 700th, 701st, 702nd, 703rd, 704th, 705th, 706th, 707th, 708th, 709th, 710th, 711st, 712nd, 713th, 714th, 715th, 716th, 717th, 718th, 719th, 720th, 721st, 722nd, 723rd, 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1008th, 1009th, 1010th, 1011st, 1012nd, 1013th, 1014th, 1015th, 1016th, 1017th, 1018th, 1019th, 1020th, 1021st, 1022nd, 1023rd, 1024th, 1025th, 1026th, 1027th, 1028th, 1029th, 1030th, 1031st, 1032nd, 1033rd, 1034th, 1035th, 1036th, 1037th, 1038th, 1039th, 1040th, 1041st, 1042nd, 1043rd, 1044th, 1045th, 1046th, 1047th, 1048th, 1049th, 1050th, 1051st, 1052nd, 1053rd, 1054th, 1055th, 1056th, 1057th, 1058th, 1059th, 1060th, 1061st, 1062nd, 1063rd, 1064th, 1065th, 1066th, 1067th, 1068th, 1069th, 1070th, 1071st, 1072nd, 1073rd, 1074th, 1075th, 1076th, 1077th, 1078th, 1079th, 1080th, 1081st, 1082nd, 1083rd, 1084th, 1085th, 1086th, 1087th, 1088th, 1089th, 1090th, 1091st, 1092nd, 1093rd, 1094th, 1095th, 1096th, 1097th, 1098th, 1099th, 1100th, 1101st, 1102nd, 1103rd, 1104th, 1105th, 1106th, 1107th, 1108th, 1109th, 1110th, 1111st, 1112nd, 1113th, 1114th, 1115th, 1116th, 1117th, 1118th, 1119th, 1120th, 1121st, 1122nd, 1123rd, 1124th, 1125th, 1126th, 1127th, 1128th, 1129th, 1130th, 1131st, 1132nd, 1133rd, 1134th, 1135th, 1136th, 1137th, 1138th, 1139th, 1140th, 1141st, 1142nd, 1143rd, 1144th, 1145th, 1146th, 1147th, 1148th, 1149th, 1150th, 1151st, 1152nd, 1153rd, 1154th, 1155th, 1156th, 1157th, 1158th, 1159th, 1160th, 1161st, 1162nd, 1163rd, 1164th, 1165th, 1166th, 1167th, 1168th, 1169th, 1170th, 1171st, 1172nd, 1173rd, 1174th, 1175th, 1176th, 1177th, 1178th, 1179th, 1180th, 1181st, 1182nd, 1183rd, 1184th, 1185th, 1186th, 1187th, 1188th, 1189th, 1190th, 1191st, 1192nd, 1193rd, 1194th, 1195th, 1196th, 1197th, 1198th, 1199th, 1200th, 1201st, 1202nd, 1203rd, 1204th, 1205th, 1206th, 1207th, 1208th, 1209th, 1210th, 1211st, 1212nd, 1213th, 1214th, 1215th, 1216th, 1217

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USING A VACUUM to hold odd-shaped parts in place for milling, at place of conventional chucks, enables Claude Vaughn to do a faster, less costly machining job. The Delta plant manufactures diam. 1/2-in. thin plates deep cuts a pneumatic block, using a production part as a pattern. A vacuum hose is attached to a steel knob pipe (shown left). Standard Orings are not in place to provide a seal. On one particular cutting, setup time was about 30 min.; subsequent parts took only six seconds to place at the vacuum holding station. Tests indicate that this type of fixture is most suitable for chuck milling. Up to 30-lb. weight even conventional self-fixtures are clamped for the job.

► **Berk Aircraft Corp.**, Walnut, has delivered its 3,000th wing for Lockheed T-33 jet trainers since the first started deliveries of complete wings in 1951.

► **Mallory Industries, Inc.**, Ridgeport, Conn., aircraft component and aircraft engine repair, has a contract to completely convert sixteen of New York Airways' five Sikorsky S-55 airplanes.

► **White Industries, New York, N. Y.**, aircraft equipment manufacturer, has set up an Aircraft Division encompassing their department electronic products, electromechanical products and mechanical products. The firm plans to move into double its current production facilities.

► **Steel Improvement & Forge Co.**, Cleveland, has purchased the Champion Forge Div. of Champion Industries, Inc. The acquisition will enable Steel Improvement to handle a much wider range of aircraft forgings, up to one-ton.

► **Howard Foundry Co.**, has increased floor area of its new Milwaukee plant to about 65,000 sq. ft. and production capacity five times. About 150 people are now employed in the plant. Howards produces "lost wax" investment castings and more than 75% of its output is for aviation.

SOLVES High Temperature SEALING

Assurance of positive seal under high temperatures and pressures need no longer be a problem. Sylphon metallic Reed Seals are engineered to meet these conditions efficiently and dependably. They are used successfully in many applications in aircraft, hydraulic systems, Diesel and other engines and in the chemical and other industries.



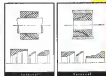
Sylphon Reed Seal, installed



Complete all-metal seal



Exploded view showing parts



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EQUIPMENT



New Face in Valve, Control Field

Clifford's young aircraft division makes bid for market in temperature regulators, pneumatic units.

By George L. Christian

South Boston, Mass.—Clifford Manufacturing Corp.'s young Aircraft Valve and Control Division is a small but vigorous contender for markets in the general field of aviation temperature controls.

The division is now in full production on items for the Martin F-104 Scramjet, Northrop F-105D Sceptor and Republic RF-105 Thunderbolt. In addition, during the next several months the division is scheduled to receive orders for various models of pneumatic actuators and other aircraft controls.

► **Scramjet Control**—Division officials predict that the next few years will produce orders for the cockpit temper-

ature control system for the F-104. The scramjet has a number of interesting concepts, including unusual construction and maximum possible use of minimum components.

Unusual construction makes it possible to get the plane back into the air as soon as possible after a malfunction, because the system's components are grouped in interchangeable units. Any malfunction may be quickly and easily traced to the defective component's back in completely replaced with another unit. Some slight adjustment may be required, depending on the component and the plane is returned to service with a minimum of delay. Troubleshooting can be repeated later at the depot.

Subminiaturization results in the smallest and lightest package to do the

job at hand. Senior Engineer, Clifford's aircraft control valve manager, who is largely responsible for setting up the Aircraft Valve and Control Division, says that the control box units in the F-104 system are the smallest in the market. The box weighs 28 oz and contains 400 sq in. The connector adds 1 in. to the 4-in. diameter.

Units within the control box are the amplifier, which comprises a novel pulse element and regulated tubes, also valves, to operate valve stations, transducers, which in the waste gases supply, calibration and, with which the system's electrical bridge is calibrated, since this is to eliminate any possible interference the control might set up with the aircraft's radio.

However, it is placed with the amplifier's pulse element, which has two contacts instead of three. The unit is not as easy to handle, so it is in a metal shield and is rugged and almost indestructible. It is small and lightweight. ► **Sensor Element**—Valve and Control manufactures several types of single and dual air temperature sensing elements.

The elements consist of leads of thermocouple material, housed in a protective metal tube. The thermocouple material is protected from shock by a cushion mounted between it and the metal tube.

Division says the units are very accurate, small, long-lasting and accurate in vibration. They peak in performance temperatures with a high degree of accuracy, maintaining desired temperatures with close tolerance, he claims.

► **Heat Exchanger**—Valve and Control says that Valve and Control has an full production on its own heat exchanger for the RF-105. The exchanger is an integral member of valves and actuators. It is used as a boundary element for the control compartment of the engine's main sensor plane. It keeps the compartment at a temperature which provides neither too much nor too little, thus preventing lagging or obscuring of response.

The division also makes high trigger rate, high pressure valves for the RF-104.

► **Design Credit**—Division gives Frank Wood, Clifford engineer, credit of the credit for the design of these units, stressing quick and easy component placement and maintenance.

He says that Wood, who spent many years with Texas Controls Air Lines in an electronics engineer, has "valued ideas on how to get airplanes back into the air again with a minimum delay . . . how to design equipment so that if it malfunctions, the trouble may be isolated rapidly, how the equipment may be replaced so that the offending component may be quickly replaced and repaired at least."

► **Solid Backing**—The division, which got into production on aircraft valves



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in mid-1952 and into the aviation field in late 1953, depends on a certain extent on the solid backing of its parent organization, Clifford.

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The gear checker measures 24x20x14 in.

Notepad: Roadway & Machine Co., 5800 St. Jean Ave., Detroit 11, Mich.

Rescue-Cargo Hoist Moves 1,200-Lb. Load at 50 Fps.

New rescue and cargo hoist comes in complete package, including electric motor with magnetic brake, gear reduction, cable drum and level winding mechanism.

The hoist can raise or lower a potential load of 800 lb. at the rate of 50 fpm; maximum operating load is 1,200 lb.; maximum static load is 3,000 lb. The 14 hp. 208v., 5,500 rpm. motor pulls up to 150 ft. of 3/4-in. cable in six even layers on the drum. Weight of the complete assembly, except cable, is 35 lb.

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AIR TRANSPORT

Pilots Threaten to Ground 'Big Three'

• AA votes 'overwhelmingly' to strike, ALPA reports as it files for injunction against waiver of 8-hr. rule.

• Meanwhile five senators introduce a bill that puts statutory limit on daily hours crews can work.

By Richard Babinette

An transport industry avoided Air Line Pilots Ass'n's new move last week in the threatened strike of those of the Big Three airlines, with talks still coming in from pilots of United Air Lines and Trans World Airlines.

They were late developments at ALPA flight Civil Aeronautics Board's recent waiver of eight-hour time limit to prevent crews to fly as much as 10 hours on standby flights (Aeronautics News June 21, p. 14).

• **American Airlines** 1,200 pilots voted "overwhelmingly" in favor of a strike, ALPA reported.

• The pilots' union filed for an injunction in New York County Court at Albany to restrain CAB from allowing the airlines to schedule pilots to fly in excess of eight hours.

• A bill sponsored by Sen. John W. Bricker, R-Ohio, and Sen. J. C. Stennis, D-Miss., and H. R. 10,000, which would be introduced in the House by Rep. W. W. Wicker, D-Texas, was introduced in the Senate to limit flight time to eight hours. The sponsors included three Republicans and two Democrats.

• CAB denied ALPA's request for a consideration of the Board's waiver order.

It is summarizing the strike talks of American pilots, ALPA president C. N. Sorenson said, the vote expressed the union's to call a work stoppage unless the airlines stop scheduling in pilots above "normal flight limits."

• U. S. Action-ALPA was expected to set a strike date after obtaining the results of both United and TWA following, due by midnight. The union said it would follow with "complete compliance" the requirements of the Railways Labor Act (National Medication Board will be kept informed of ALPA's action).

If a strike is called, the government is expected to step in to avoid a national emergency that might result in a shutdown of the nation's largest airline.

A period then would be set for resolution of the dispute between the companies involved and the pilots.

If a strike is called, the union will put out all pilots—not just those who

are involved in the standby operation.

• **Safety Rule**—ALPA's argument against CAB asked that the Board be destroyed until a political review of its recent action could be held. The union based its court action on what it called "CAB's improper procedure" in granting waivers to permit airlines to fly their pilots more than eight consecutive hours a day.

"The eight-hour daily flight time limit has been a pilot safety rule for 15 years," Sorenson said. "It should not be destroyed in hasty proceedings in which there was no opportunity to produce evidence and the Board members have not had enough time to thoroughly review the facts and arguments themselves with the complete technical aspects involved."

• **Senate Bill**—to the bill introduced in the Senate which was designated by the union, ALPA and three public bodies would be drafted from passage.

• **Association of manufacturers** of established safety standards by prohibiting pilots from exceeding eight hours on continuous flight duty under normal conditions.

• **Insult** to an interpretation a reliability of schedules that in many instances now is lacking. This should involve public confidence in air transportation.

• **Enhance the stability of the industry** that is threatened when airline safety standards may be altered because of competitive pressure brought to bear against rules that are changeable but are not negotiable. Congressional action will eliminate any possibility.

To introduce its bill, ALPA obtained two pilots (Wright and Goldwater) and the advice of the Civil Aeronautics Act (McCarren).

Although the union rapidly is drawing in a close, the fact that both the union (Brewer) and former chairman of the Senate Interstate and Foreign Commerce Committee are backing the bill had observers to believe that such a bill may get prompt attention.

• **Flights Continued**—Meanwhile, the three airlines concerned were continuing their standby schedules and, from

all airports, were not suffering from empty seats.

American clustered its first Wake region—Los Angeles DC-7 nonstop flight the work person of National Airport with Mrs. Richard M. Nixon, wife of the Vice President, visiting the champagne bottle.

The first flight to the West Coast completed the leg in 7 hr 45 min. American has scheduled the east-west route for 8 hr 10 min and the return flight in 7 hr 15 min.

• **ALPSA Action**—Air Line Pilots Ass'n and Stewardesses Ass'n officials in Chicago announced the union "has no objection to allowing indispensable violations of its agreements as a result of the CAB decision to grant a waiver of the eight-hour limitation for transcontinental operation."

ALPA and it is not generally known that CAB union has extended the protective provisions of the Civil Air Regulations to cover the flight attendants. As a result the flight time limitation for the steward and stewardess group has been developed through collective bargaining. CAB has no power to change working conditions that are negotiated in agreements between employers and employees, the unionists said.

United and TWA's stewardesses, members of ALPSA, and the flight attendants have written into their contracts American stewardesses do not. This is vital means why both TWA and TWA have scheduled their nonstop operations at 7 hr 55 min. In violation of their contract, passengers could not be scheduled out on strike.

• **ALPSA Action**—Hoping CAB's waiver order from every angle, ALPA president Sorenson suggested to CAB Chairman Chao Chao in a recent letter that the risk of British Commonwealth Pacific Airlines (B.C.P.) flight from New York, Calif., Oct. 29, 1959, as which 19 passengers and crewmen died, can have been the result of a crew more than eight hours (see p. 18).

"It is interesting to note," Sorenson wrote Chao, "that this accident investigation report was released the day after the Board waived the historic eight-hour time limit. It is interesting to note that the Board waived the historic eight-hour time limit in domestic operation which would permit the same type of scheduling pilots by domestic airlines."

CAB released the report June 15 and placed the probable cause as "fatigue of the crew in follow prescribed procedures for an instrument approach." Sorenson and the Board's report drew

as what would be "choices to potentially replace but failed to answer the essential question, why?"

"It should be publicly chosen that the events involved in this accident did not follow prescribed procedures for an engineering approach were obviously if it had there would not have been an accident," Sever wrote.

No engineering whatsoever is attached by the Board to the fact that the pilots had been continuously flying for more than eight hours at the time of the crash. It is evident that this minor problem requires further intensive study."

Canadian Lines to Ask U. S. for New Routes

Toronto—Two Canadian airlines will ask the United States next August for extension of a number of international routes and some new routes.

Canada also is expected to push for wider regional rights on Canadian-U. S. routes, with one route from each country during a service.

Canadian Pacific Airline plans to request a traffic stop at San Francisco on its Vancouver-Mexico City-Los Angeles route.

Trans-Canada Air Lines, now operating a Toronto-New York and Toronto-Bermuda service, will apply for a Toronto-New York-Bermuda route. TCA also plans to request a stop at Boston on its Montreal-Bermuda service, with east traffic rights on the Montreal-Boston service.

Western, Trans-Canada expects to expand its Toronto-Chicago route to Winnipeg, to operate its Vancouver-Victoria-Seattle service to eliminate Viscount and to apply for a direct service for Calgary to Salt Lake City.

Changes here fastest:
• American Airlines and Colonial Air Lines will ask for north service between New York-Toronto and New York-Montreal, respectively.

• Northwest Orient Airlines will apply for additional traffic stops on its route to Alaska via Edmonton.

• Trans-Atlantic Systems from Chicago may ask for traffic rights at Montreal.

AA Moves Engineers

American Airlines will move its engineering department July 12 from New York's La Guardia Airport to AA maintenance headquarters at Tulsa, where it will merge with service engineering. Development engineering director W. C. Lawrence, who reported to M. C. Beard in New York, will transfer to Tulsa to assist vice president engineering. Beard will remain in New York to assist vice president equipment development.



RIGHT: the Videtur Viscount, cockpit is explained by Capital Airlines' president J. H. Commodore (left) by the subsonic transport's designer, G. R. Edwards.

Capital Goes Abroad for Viscounts



OUTSIDE: Commodore and Edwards discuss delivery to study Dart machine (right).



CARMICHAEL CLOSING DEAL: the three Viscounts and option for 37 more (Aviation Week June 14, p. 36). From left to right: Charles H. Macdonald, chairman of CAP's executive committee; Commodore; G. R. Edwards, CAP vice president; Douglas R. Jones, Rod Young, Vickers-Armstrong chairman; Edwards; May (Mrs. C. A. L. Douglas, V.A. deputy chairman and managing director; and R. P. H. Yapp, V.A. director.



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CAB Sets Up Mexico Service Case

Nontop U. S.-Mexico City routes to get closer study to
Board combines American, EAL and PAA applications.

A Mexico City nontop service case developed last week as Civil Aeronautics Board consolidated certain portions of Pan American World Airways' and Eastern Air Lines' applications with American Airlines' request for a Washington/New York-Mexico City route.

American wants the nontop route in order to compete effectively with Air France, present holder of the lucrative route. Pan American and Eastern joined the case (American Wings Feb. 11, p. 14) in an effort to get a comparable route. The Board approved American's naming New York-Mexico City route in January by granting AA an exemption.

Strom Helms-However, a recent day order (American Wings Feb. 11, p. 17) blocked American from beginning service. The airline had also been unsuccessful in obtaining Mexican permission to establish the nontop route, a privilege granted AA by State Department since an bilateral agreement exists between the U. S. and Mexico.

CAB's current move establishes a nontop case which will require considerable work among the three airlines involved in the future.

CAB member Jack Lee declined from that request, stating that the three airlines' proposals for proceeding with the Mexican case. His dissent outlined the factors in the case. He wrote:

"Banks Doubled"—American Airlines presently has a route from New York to Dallas and a route from Dallas to Mexico City. This proceeding was instituted upon application of American to determine if there are routes should be consolidated for the purpose of permitting American to compete nontop between New York and Mexico City.

"Gates Air Lines has a route from New York to New Orleans and a route from New Orleans to Mexico City. The majority has failed only this order the base of consolidating Eastern's route to determine if that carrier should operate nontop between New York and Mexico City.

"While the order of the majority indicates the sense of consolidating Eastern's Mexico route with its domestic route, President Eisenhower has not yet passed upon the validity of Eastern's Mexican route which was previously approved by President Truman.

"Cons Eastern Position"—The majority itself recognizes the implications of this problem in indicated by the language in its order which usually states that the motion of Eastern's

application does not imply any definite action by the Board as to the legal status or validity of the route authorization previously granted to Eastern for operations between New Orleans and Mexico City. This places Eastern at a distinct disadvantage because Eastern does not rely solely upon the consideration of its two routes when there is doubt as to the validity of one of them.

"Therefore, in order to proceed with it, it will be necessary for Eastern to also prove public convenience and necessity for a new route from New York to Mexico City. This will require the presentation of substantially more evidence than will be required of American to support merely its application for consolidation since there is no doubt of the validity of either of its two routes.

"Under the circumstances I believe that the Board should request a ruling from the President regarding the legality of Eastern's certificate before moving ahead with this proceeding."

Opposes Consolidation—Lee added that the case should not be continued because of the impending bilateral negotiations with Mexico. In the absence of a Presidential ruling on the legality of Eastern's certificate, Lee said, Eastern faces the substantial likelihood of whether the bilateral negotiations will result in a route for a U. S. carrier from New Orleans to Mexico City.

"Since the majority has indicated Eastern's Mexican route in the majority proceeding and no action has been taken by the Board or President Eisenhower to bring emergency proceedings against Eastern's Mexican certificate,

Eastern has a right to assume that the government will attempt to obtain existing rights for such a route from the Mexican government," he said.

C-46 Modifications

Get Nov. 1 Deadline

Curtis C-46 Commando operation have until Nov. 1 to make a firm commitment to Civil Aeronautics Administration Field 2. List of modifications to the two-engine transport to meet CAA transport category requirements.

Civil Aeronautics Board, in a special Civil Air Regulation, set three new deadlines for the operation.

By Oct. 1, 1959, the transport should be modified to comply with all requirements of the transport category except flight requirements. This would allow equipped nacelle for protection and engine cooling.

By April 1, 1960, it should comply with transport category performance limitations, except that the use of auto-rotation will be permitted in lieu of the requirement to meet the first and second segment climb requirements with the power of the respective engine windmilling.

On and after April 1, 1960, the C-46 must meet performance operating limitations applicable to transport category aircraft, except that "the use of a ditching procedure will be permitted as long as it complies with the emergency ditching requirement when such a procedure is required by the Administrator."

The ruling came after the Board approved the 10,000 modification proposal of the Aircraft Engineering Foundation and the 145,000 Aircraft Engineering Services proposal. Of the 150 C-46s used by U. S. civil airline operators, 110 are owned by members of



French Test New Transports

The Hord Dubois HLD 31 and HLD 32, two-engine transports featuring high-speed wings, by side by side behind the city skyline. HLD 31 is a new prototype (upper left) which usually states that the motion of Eastern's

powered by two 350-hp. Wright Cyclone, the 47-passenger HLD 32 has two 3,200-hp. P&W R100s. The HLD 32 is currently being modified to the production configuration—two engines and a tail fin—during a test program which will last until September

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the Aircraft Engineering Foundation.

Although several reputable agencies have reported that the aircraft may be modified at considerable cost to meet these performance limitations, other agencies maintain that the entire U-5 and C-46 fleet could not be accommodated with available stocks of spares and parts necessary to such modification," the Board said.

"Even if such material were available, the cost of modification would be prohibitive. The Board is of the opinion that such evidence tends to indicate that, following a decision by the Board with respect to the future disposition of the C-46 as well as other agencies, means for accommodating the entire C-46 fleet may be put at the disposal of operators in a relatively short time," CAB said.

CAB ORDERS

(See 10-15)

APPROVED

Extension of term of the contract on express agreement with Railway Express Agency from June 1 through July 31 to complete work on a new express contract. Application of William Stokeland and Allegheny Airlines Inc. for the New York sub to be served on the carrier's local while acting as a director of Flying Tiger Line.

GRANTED

Grant Airlines permission to suspend all transcontinental scheduled route from Aug. 15 to Jan. 17.

DENIED

Schindler & Western Airlines' application for exemption to perform two flights between New York and Stuttgart, Germany, during July and August.

Failure of St. Cloud, Minn., for reconsideration of its request regarding denial of North Central Airlines' application to suspend service at St. Cloud.

EXTENDED

Suspension period of lines of several Alaska air operators from June 22 to and including Sept. 20 to give CAB more time to investigate the request.

Five Airlines' World Airways' authority to suspend temporarily service at Honolulu, Venezuela.

DISAPPROVED

Application of Teton Air Service, Arctic Pacific, Golden North Airways and Air Corps Express in the States-Vietnam area.

Proceedings in the matter of a space available for payment by Transwestern Air Lines between Guam Island and Honolulu.

AUTHORIZED

Southern Airways to suspend service temporarily at Yonkers, Mass.

FINED

Final suit filed for Southwest Airlines' domestic and Latin American operations.

SUSPENDED

Stewart Air Service's scheduled operation on its regular routes.

SHORTLINES

► Air Transport Assn. Reports interstate transactions through AT/airline have totaled \$19,811,568 in May, compared with \$55,444,043 in the same month last year.

► Allegheny Airlines has assigned routes to Buffalo, Erie, Erie, Cape May and Wildwood, N.J., to New York Washington-Pittsburgh flights.

► American Airlines flew 565,000 passengers a total of 125,990,000 passengers and carried 4,860,000 tons miles of airfreight during May. Passengers were 12.2% higher than for the same month a year ago, with an increase of more than 9% in the number of passengers carried.

► British Overseas Airways Corp. has issued a travel booklet containing information on landing flights, making hotel reservations plus currency and customs problems.

► Korean's Civil Air Fleet has inaugurated a new passenger route from Moscow to the Siberian port of Vladivostok via Seoul, Nakhchivan, Krasnoyarsk and Yakutsk, Plovdiv reports.

► Southern Airways has celebrated its 10th anniversary, climbing up a total of 451,000 passengers carried plus some 3,600,000 lb. of aerial and 3,138,145 lb. of air express with a perfect safety record.

► Soviet-Korean Air Transport Joint Stock Co. (Seokol) has started a new air link between North Korea's capital of Pyongyang in China in central South Korea, the Communist journal, Jongsu, reports.

► Swissair increased its total savings by 70% during April, compared with the same month of last year. During the first four months of 1954, the airline carried more passengers than during the entire year of 1953.

► United Air Lines flew 270,199,000 revenue passengers in May, 14% more than in the same month of 1953. Freight shipments increased 17% . . . UAL's promised its outstanding performance award for the quarter ended May 31 to Capt. A. C. Bell in recognition of his work piloting a DC-7 flight manual.



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News Sidelights

Canada 340 km. order have gone to 201 with most purchases by Israeli Airforce of five of the transports (Aviation Week June 7, p. 114). Thirty three domestic and foreign carriers have bought 562 Moskos 240s and 340s, with others going to the military and to executive plane users.

The Swedish impact tax of 1952 on helicopters and jets has been removed, effective July 1st, and plane sales can now be reported day-free.

More than 600 students have been taught to fly in 15 hours—less than half the time elapsed on one-day flights at the University of Illinois system of printed pagelets through a special Link trainer, the college reports. The school puts students through the flying processes in the Link under an instructor's guidance, follows this with 10 hours on time of night, instrument training, and just before finalization and a 1,500-m. cross-country flight.

Flood Oilfield's Airtelers, Inc., recently incorporated in 1945 to buy and lease planes to airtelers but has done practically everything except that, recently received stockholder approval to swap several of its rich natural gas in exchange for control of Linden Comm. Corp., Utah. Among the firm's diverse activities was making, various patterns, nuts-and-bolts, and mining.

Old-fashioned cars or sheet metal make fine radar reflectors on target recognition for so as to give greater precision and speed to hit less, USAF notes. It-60 for the same make ready as against 525 such for the former more complex type. One AF has estimated it has saved now, thus \$63,800 annually using makeshift reflectors.

First Japanese whaling fleet to use a crypter to avoid against seriously has returned from the Arctic with a record catch of 42,000 tons of whale, most and oil. The fleet's three plane fleet crypter helped catch more than 1,000 whales, officials note. In addition to finding the whales, the crypter dispatchers lead to the mammals, who are wrapping for the fleet and its use.

Howard Hughes, acting through Hughes Tool Co., Houston, Tex., has now taken total order Glenn McCarthy at Houston for \$145,000 for which he alleges McCarthy was in for purchase of a plane flying SA-107. Stratosphere transport.



FOUR GENERATIONS OF FIGHTERS—Yemen of World War I and II the Korean war and the Air Force's latest supersonic type and a jet less, USAF notes. It-60 for the same make ready as against 525 such for the former more complex type. One AF has estimated it has saved now, thus \$63,800 annually using makeshift reflectors.

AVIATION CALENDAR

- July 13-15—Western Plant Maintenance Show, sponsored by Chrysler Corp., Pacific Airfield, Los Angeles.
- July 14—Cale Brothers Air Show, sponsored by North Group of the Civil Air Patrol, West in Reynolds, Calif.
- July 15—Third National Aviation Education Workshop, sponsored by Civil Air Patrol and the University of Colorado, Boulder, Colo.
- July 14-15—Midwest Ann Club annual aviation exposition Detroit Wayne, Mich. August. Events include biennial annual F-16 Sales men, sponsored by the Navy's "Star Angels" and USAF's "Thunderbolt".
- July 17-18—National National Steering and Control, Detroit, Mich.
- Aug. 7-8—Upcoming Aircraft Assembly annual National Air Festival and annual annual fly-in and convention focusing "baseball" events, sponsored by the Navy's "Star Angels" and USAF's "Thunderbolt".
- Aug. 8-10—National Society for Quality Control, first annual Western National Conference, to be held in conjunction with the National Conference of the 10th Technical Committee, U. S. Civil Aeronautics, San Diego.
- Aug. 9-10—Institute of the Aeronautical Sciences, further presented as transports for operations, Seattle.
- Aug. 20-25—Western Aircraft Show & Convention (WESTCON), sponsored by West Coast Aircraft Sales, Ann and hosts of Radio Engineers, Amsterdam Hotel, Los Angeles.
- Sept. 4-6—National Aircraft Show, Dayton, Ohio.
- Sept. 7-8—University of British Columbia Air Show, 1944 Flying Display, Vancouver, British Columbia.
- Sept. 20-22—International Society of Aeronautics and Astronautics, 1944 Flying Display, Vancouver, British Columbia.
- Sept. 21-22—Society for Experimental Sciences, annual meeting and exhibition, Vancouver, British Columbia.
- Oct. 4-6—Third annual National Electronics Conference, Hotel Sheraton, Chicago.
- Oct. 17—Champion Spark Plug Co., 20th annual Aircraft Spark Plug and Ignition Conference, Sheraton Hotel, Toledo, Ohio.
- Oct. 18—Society of Automotive Engineers National Aerospace Meeting, Aircraft Production, Parents and Aircraft Engineers Display Hotel Sheraton, Los Angeles.
- Oct. 17-22—International Union of Aeronautics and Astronautics annual meeting, New York.
- Oct. 18-22—National Safety Council Aviation Section, Grand Hotel Hotel, Chicago.
- Nov. 19—National Aeronautics Trades Association convention and meeting, Wilshire Hotel, Miami Beach, Fla.
- Nov. 8-10—Air Industries Transport Association annual meeting, Chateau Frontenac, Quebec City.
- Nov. 10-12—Industrial Management Society, 10th National Trade and National Study and Management Council Hotel Sheraton, Chicago.
- Nov. 12-14—Third State Aviation Convention, California.

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9	ALCOA ALUMINUM CO.	36	DAVID GREENGLASS COMPANY
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13	ALCOA ALUMINUM CO.	40	DAVID GREENGLASS COMPANY
14	ALCOA ALUMINUM CO.	41	DAVID GREENGLASS COMPANY
15	ALCOA ALUMINUM CO.	42	DAVID GREENGLASS COMPANY
16	ALCOA ALUMINUM CO.	43	DAVID GREENGLASS COMPANY
17	ALCOA ALUMINUM CO.	44	DAVID GREENGLASS COMPANY
18	ALCOA ALUMINUM CO.	45	DAVID GREENGLASS COMPANY
19	ALCOA ALUMINUM CO.	46	DAVID GREENGLASS COMPANY
20	ALCOA ALUMINUM CO.	47	DAVID GREENGLASS COMPANY
21	ALCOA ALUMINUM CO.	48	DAVID GREENGLASS COMPANY
22	ALCOA ALUMINUM CO.	49	DAVID GREENGLASS COMPANY
23	ALCOA ALUMINUM CO.	50	DAVID GREENGLASS COMPANY
24	ALCOA ALUMINUM CO.	51	DAVID GREENGLASS COMPANY
25	ALCOA ALUMINUM CO.	52	DAVID GREENGLASS COMPANY
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32	ALCOA ALUMINUM CO.	59	DAVID GREENGLASS COMPANY
33	ALCOA ALUMINUM CO.	60	DAVID GREENGLASS COMPANY
34	ALCOA ALUMINUM CO.	61	DAVID GREENGLASS COMPANY
35	ALCOA ALUMINUM CO.	62	DAVID GREENGLASS COMPANY
36	ALCOA ALUMINUM CO.	63	DAVID GREENGLASS COMPANY
37	ALCOA ALUMINUM CO.	64	DAVID GREENGLASS COMPANY
38	ALCOA ALUMINUM CO.	65	DAVID GREENGLASS COMPANY
39	ALCOA ALUMINUM CO.	66	DAVID GREENGLASS COMPANY
40	ALCOA ALUMINUM CO.	67	DAVID GREENGLASS COMPANY
41	ALCOA ALUMINUM CO.	68	DAVID GREENGLASS COMPANY
42	ALCOA ALUMINUM CO.	69	DAVID GREENGLASS COMPANY
43	ALCOA ALUMINUM CO.	70	DAVID GREENGLASS COMPANY
44	ALCOA ALUMINUM CO.	71	DAVID GREENGLASS COMPANY
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46	ALCOA ALUMINUM CO.	73	DAVID GREENGLASS COMPANY
47	ALCOA ALUMINUM CO.	74	DAVID GREENGLASS COMPANY
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54	ALCOA ALUMINUM CO.	81	DAVID GREENGLASS COMPANY
55	ALCOA ALUMINUM CO.	82	DAVID GREENGLASS COMPANY
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57	ALCOA ALUMINUM CO.	84	DAVID GREENGLASS COMPANY
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63	ALCOA ALUMINUM CO.	90	DAVID GREENGLASS COMPANY
64	ALCOA ALUMINUM CO.	91	DAVID GREENGLASS COMPANY
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